1859 FIFTY-EIGHTH YEAR 1917

Chemical Lib.
FEB 12 1917
UNIV. OF MICH. LIBRARY

AMERICAN GAS ENGINEERING JOURNAL

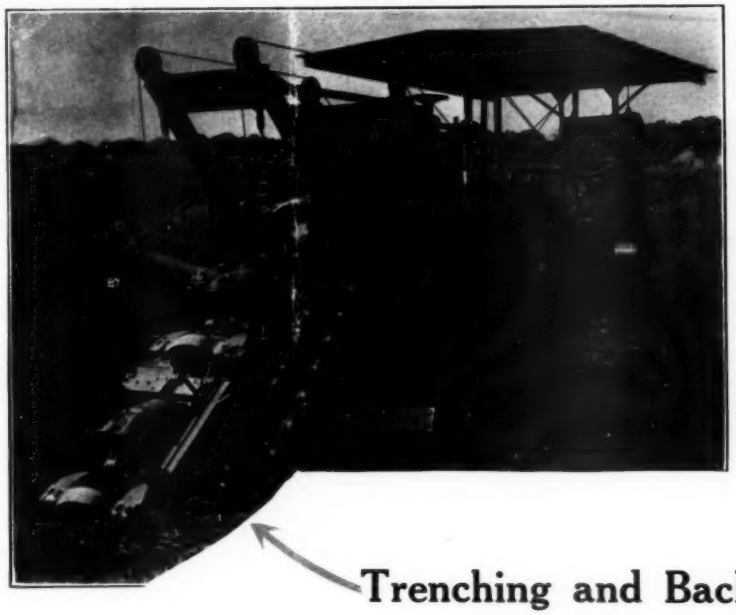
FORMERLY

AMERICAN GAS LIGHT JOURNAL

VOL. CVI., NO. 7
WHOLE No. 3075

NEW YORK, SATURDAY, FEBRUARY 10, 1917

Subscription $3 per year
$4 Canada $5 Foreign



Parsons Profit-Making Machines

Trenching and Back Filling

When you have a trenching job that runs into big money, you can save a big part of that money by the use of **Parsons Trench Excavators** and—the latest addition to our line of money-saving machines—**Parsons Back Fillers.**

Think of one-man-control machines doing the work of a small army of men and teams!

We make several models of these machines, each with a wide range of capacity, and will appreciate a chance to consult with you over your next big pipe-laying job. You'll find our catalog interesting, anyhow. May we send you a copy?

THE PARSONS CO., 410 4th St., NEWTON, IOWA

Eastern Sales Office: 18 West 34th Street, New York City

INDEX TO CONTENTS, PAGE 156 ADVERTISERS' INDEX, PAGE 18

MANAGERS OF SMALL GAS WORKS

should look into the question of installing

DESSAU VERTICAL RETORTS

They are built as small as 175,000 cu. ft. per day.
The Investment Cost is low and there is obtained:

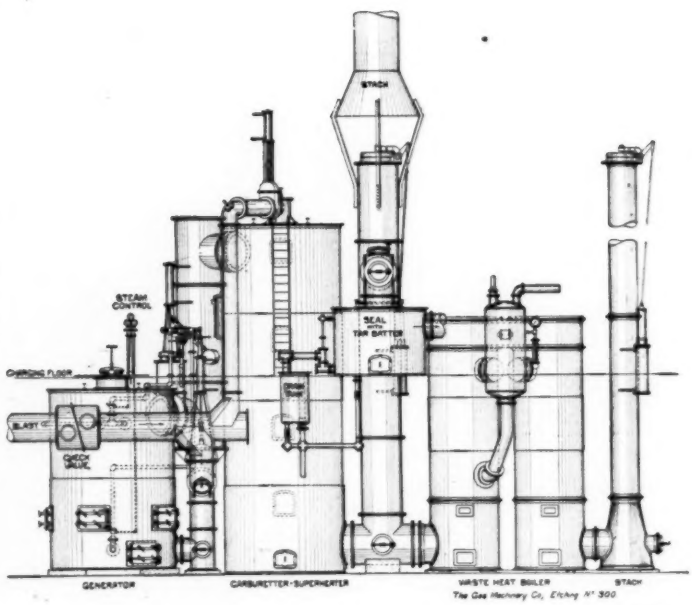
HIGH GAS AND AMMONIA YIELD,
HIGH YIELD OF THIN TAR,
LOW LABOR COST.

WATER GAS CAN BE PRODUCED IN THE RETORTS

Resulting in high yield of standard B. T. U. gas.

THE UNITED GAS IMPROVEMENT CO., Philadelphia,

would be glad to take it up with you.



The Gas Machinery Co. Etchg N° 300

Carburetted Water Gas Apparatus

with Carburetter - Superheater and Patented Waste Heat Boiler

Advantages:

Smaller Ground Area
Less Radiating Surface
Reduced Back Pressure in Machine
Increased Efficiency

The Gas Machinery Co.
CLEVELAND OHIO

AMERICAN
GAS ENGINEERING JOURNAL

FORMERLY THE AMERICAN GAS LIGHT JOURNAL

Vol. CVI, No. 7 NEW YORK, FEBRUARY 10, 1917 Whole No. 3075

Gas Equipment for Railroad Shops

Installation at Shops of Chicago and Northwestern Railroad Company at Winona, Minn., Described—Some Burners Use 1500 Cu. Ft. of Gas Per Hour—Greater Part of Equipment Made in Shop

By W. F. CLAUSEN,

Manager, Wisconsin-Minnesota Light & Power Company, Winona, Minn.

Ever since the introduction of artificial gas as fuel for industrial purposes there has been a great deal of energy and no small amount of money expended trying to displace cheaper fuels with gas; and, in many cases, due to persistent effort, gas has won out because of its greater adaptability and closer application of the heat generated. Most all gas installations have won out, not on the basis of the cost of fuels, but because other material considerations which enter into the ultimate or finished cost of the article, have sometimes had a greater bearing in deciding what fuel to use. These items include insurance, danger of handling by workmen, labor saving in the handling of the fuel and the time saved in doing the work.

With these advantages properly brought before the officers of the Chicago & Northwestern Railroad Company, the Wisconsin-Minnesota Light & Power Company was given an order for the installation of gas at their shops situated in the extreme western part of the city of Winona on condition that same must be entirely satisfactory.

Difficulties to be Overcome

The difficulties to overcome owing to the situation were supply and pressure. We laid a 4-in. main into the shops for service, and, after using our regular pressure with only mediocre results, we decided to use higher pressure. This was accomplished by pumping the gas up to 2 lb. with a Westinghouse compressor, using a governing valve properly set in a pipe line connected back to the inlet of the compressor, as shown in the accompanying drawing so that if the pump would deliver more gas than was being used it would simply be repumped by the compressor, but the pressure would be maintained at all times. This arrangement overcame all of our pressure troubles and we were able to deliver sufficient gas for all uses to their largest burners, some of which use 1,500 ft. of gas per hour.

We also made a by-pass connection from the service direct to the supply pipes, so in case anything went wrong with the pump the gas would be used at regular pressure. For the air supply we connected to their compressed air line on which they carry an average of 90 lb. This air line was run parallel with the gas line, and an opening was made for every gas connection. As the appliances used at these shops are portable with only a few exceptions, so that they may be used in almost any part of the shop, openings were left for connections in convenient places. The appliances are connected from the iron pipe by hose to the portable appliances.

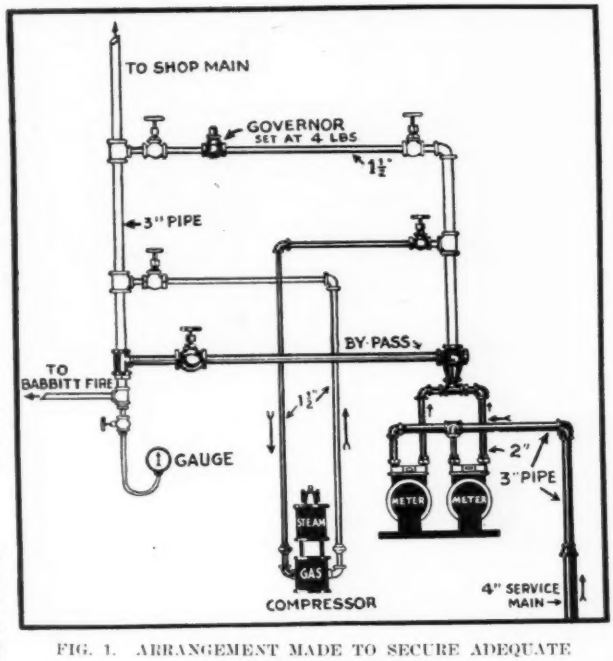


FIG. 1. ARRANGEMENT MADE TO SECURE ADEQUATE PRESSURE AND SUPPLY

FIG. 5. HIGH PRESSURE GAS USED TO HEAT PATCHES

12 Minutes to Melt 250 lb. of Metal Starting Furnace Cold

The following installations have been made in these shops: Fig. 2 shows the appliances used in the rebabbitting department. There are two No. 3 American Gas Furnace Company soft metal furnaces which have a capacity of 300 lb. of metal. One is used for new babbitting metal, the other for scrap.

Starting these furnaces cold it took 12 minutes to melt 250 lb. of metal.

The soldering iron furnace is used for heating iron of all kinds including rivets. A blast burner in the center of the bench is used for the general heating of metals. The blow torch that is being used by the operator as shown, is used for melting out the old babbitt material from the engine boxes.

Owing to the intense heat obtained from the use of high pressure gas, the metal melts at just a touch from the flame which is very desirable, as it saves time which is the big factor for its successful operation in these shops for the last four years. Other burners are used in this department that are made in the shape of the surface of the boxes to be rebabbitted, which heats the surface just before the babbitt metal is poured. It has been found that in so doing the babbitt adheres to the metal better than if the casting is cold.

Fig. 3 is the regular type forge used for heating pipe in the fitting department. As there is considerable pipe bending to do on a locomotive this is a very handy piece of apparatus. A 2-in. extra heavy pipe is heated hot enough to work in less than two minutes. There are two of these in use at this shop.

Fig. 4 is the type of rivet heater of which there are five in use. These were made at the shops as were most all of the gas using apparatus. They are, however, very efficient and very satisfactory. It is hard to describe the speed of heating that can be attained with these heaters and the speed of the operators is the only limit to the amount of hot rivets turned out. They have displaced the old coal fire for the same reason already stated, namely speed.

Higher Flame Temperature Attained from Blow Torch

Fig. 5 shows one of the many uses blow torches are put to. The operator is heating up a patch, a new insert on the boiler. As the patch heats up red hot it is driven home and riveted. It takes but a few minutes to do this and it has been a great help in this work. This picture per-

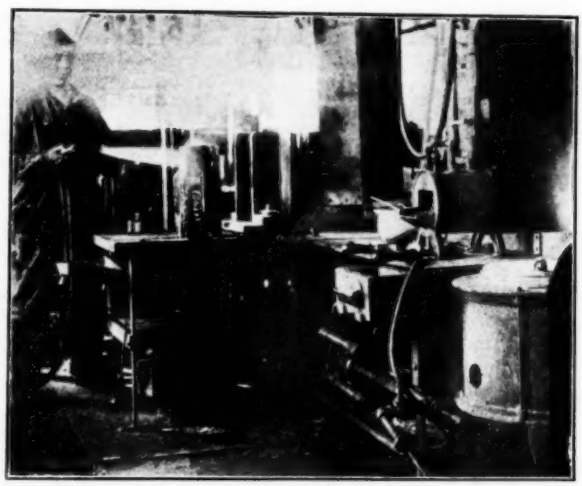


FIG. 2. SOFT METAL FURNACES USED IN REBABBITTING

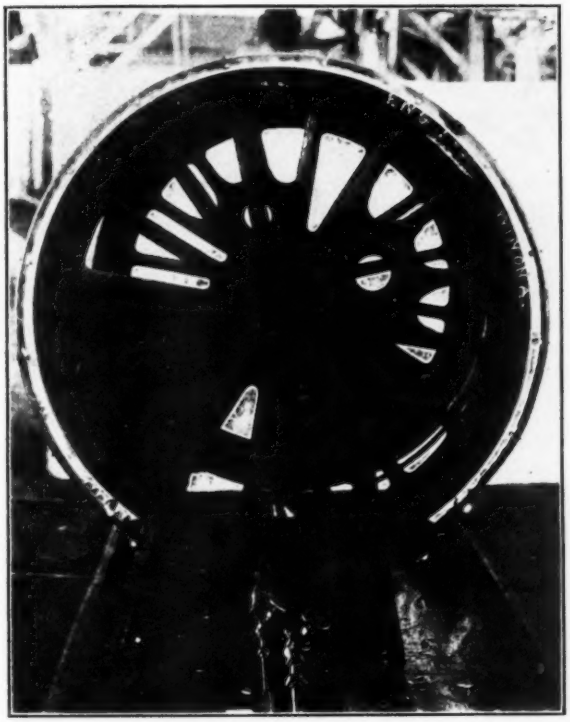


FIG. 6. GAS HEATER USED TO EXPAND ENGINE WHEEL TIRES

haps shows best the result of using high pressure gas. Note the length of the flame and still this burner is using 1,200 cu. ft. of gas per hour. By having sufficient gas and air supply we are able to

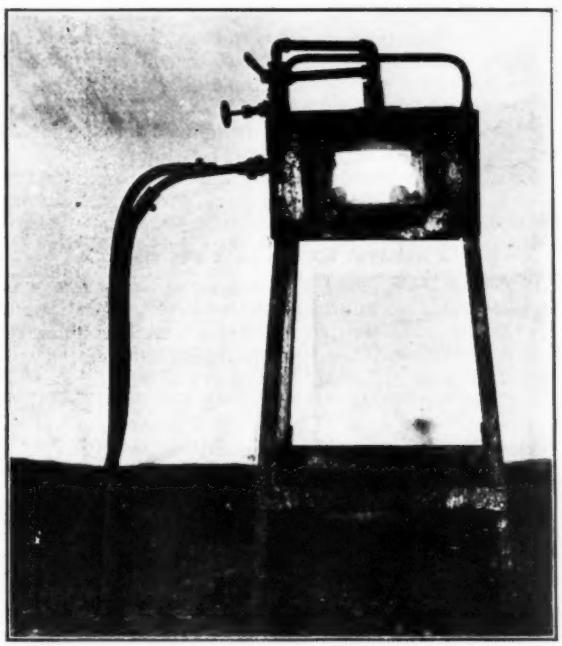


FIG. 4. RIVET HEATER WHICH DISPLACED OLD COAL FIRE BY ITS SPEED

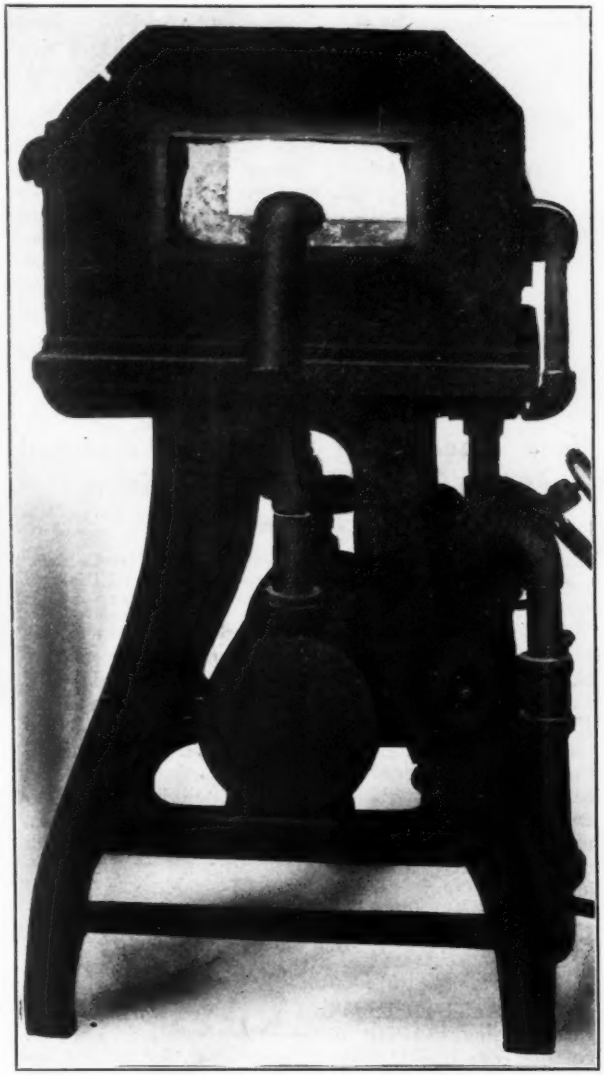


FIG. 3. REGULAR FORGE USED IN PIPE FITTING DEPARTMENT

reduce the area of combustion and thereby attain a very high flame temperature so necessary in work of this kind. This may be contrary to the theoretical combustion of gas, but we have found that we can attain a higher flame temperature by supplying as much air as possible and still maintain combustion. We have not had the opportunity to make tests on this point with thermometers that would indicate these high temperatures, but from the actual experience of the operators, extending over a period of four years, it has been determined that the best results are thus obtained.

Fig. 6 represents the tire heater which is used to expand the tire of an engine wheel either to put on or take it off as the case may be. These burners are made of 1-in. pipe with ⅛-in. holes drilled 1 in. apart. The ring is set 1¾ in. from the wheel for combustion space. The burners are made in all sizes up to 72 in. and are equally satisfactory for the largest as well as the smallest. The gas and air supply is taken from one of the drops, with

hose connections to the burners. The time consumed in taking off a tire is from 7 to 15 minutes, depending entirely on the size and thickness thereof.

Other Uses of Gas

Gas is used for many other purposes than those that I have mentioned. The tin shop, boiler and machine shops use it for heating of all kinds of metal and it has become an integral part of the large repair shop and an important factor for its reliable, safe and speedy opereation. During the four years that gas has been used in these shops no accident of any kind has been attributed to its use.

It has been satisfactory both in operation and cost and has saved many a dollar in labor for the big institution.

Very Successful Results Obtained with Coke for Steam Raising in England

Steam-Driven Lorries Working on It as Well as Colliers and Steam Tugs—Briquetting as a Means of Disposing of Small Waste and Surplus Tar

The yield of coke in ordinary gas works practice is about 65 per cent. of the coal carbonized, declared John S. S. Brame, professor of chemistry at the Royal Naval College, Greenwich, in his lecture on "Coal and Its Economic Utilization," delivered before the Royal Society of Arts, Dec. 4, 1916. On the total carbonized annually in England this will amount to some 11,000,000 tons, and although about 15 per cent. will be required to carry out the carbonization, and probably 1,500,000 tons is converted into the water gas for admixture with the coal gas, there is a large surplus to find economical outlets for.

Practically the Whole of the Fuel Consumed on the Grate

Considerable attention has been given to its use for steam-raising. Owing to the almost entire absence of volatile constituents, coke is difficult to ignite and requires a strong draught, so that forced or induced draught has to be installed. The London Coke Sales Committee has developed a special grate for the use of coke.

The conditions of combustion are different from those with coal, because there is very little gas to burn, except perhaps a flame of carbon monoxide, the whole of the fuel being practically consumed on the grate. Less excess air is consequently required for combustion, thus reducing heat losses in the flue gases. An advantage is the absolutely smokeless combustion.

Because of its porous nature the stores and bunkers hold a smaller number of potential heat units than with coal, and the ash is, of course, higher than with coal, averaging about 1.4 times the coal ash. This may lead to clinkering, since the fuel is all burnt on the grate under good draught, so that high calorific intensity is obtained.

It has been claimed that the sulphur in coke is detrimental, but it is difficult to see why this should be, for during the production much of the original sulphur escapes in the gas and tar, coke containing usually about 70 per cent. of the sulphur originally present in the coal.

Sixteen Per Cent. Saved During Month in Fuel Costs for Steam Raising

Very successful results have been obtained with coke for steam raising. At Deptford, over a period of one month, 16 per cent. was saved in fuel costs. Steam-driven lorries are working on coke, as are also colliers belonging to some London gas companies and steam tugs. With the present high prices of coal and difficulties of delivery, many power-station engineers are either already employing coke or putting in hand the necessary alterations for its adoption.

With water-tube boilers, the probable development will be on the lines of an internal producer, primary air being used to gasify the coke in an arched chamber, through openings in which the gases will pass, then mixing with the secondary air to complete combustion. In this way smokeless flames would result and the brick arch would form an efficient radiating surface. The drawback would be that extensive alterations would be requisite if coal had to be burnt.

Briquetting of Small Wastes

Another development in the use of coke of quite recent date is the briquetting of the small waste which accumulates at gas works, and is of little value. This method is of considerable importance at present because, with the large production of tar and the closing of the Continent to the shipments of pitch, this material is accumulating at most works, and the use of a portion to assist in converting the unmarketable coke into a fuel of the selling value of $3.00 per ton is a double economy.

A plant installed at Smethwick Gas Works over a year ago has proved very satisfactory. In manufacture the coke dust is graded to pass a ¼-in. mesh sieve, and is mixed with 8 per cent. of pitch, this mixture being fed to the disintegrator. In the heater a little tar is added, and the hot mass briquetted at 6 tons pressure. At Smethwick the plant relieves the works of about one-sixth of the pitch made. If the coke breeze were also briquetted, one-third of the pitch could be utilized.

The briquettes are suitable for closed stoves, ranges, etc., and form the only boiler fuel used at the works. For the usual open grate the draught is insufficient to burn them without a proportion of ordinary coal.

Similar plants for briquetting, but of greater capacity, are being installed at Coventry and Northampton.

Failure to Give Credits

In the Jan. 13 issue of this journal an article was published on a gas-burning cloth-singeing installation. This article was written from information obtained from the Southern Gas Association Bulletin No. 2, but did not indicate, or credit, its source. In the issue of Feb. 3, the article on "Cultivating the Qualities that Determine Success or Failure in Engineering" was abstracted from an article published in the *Monad*, the journal of the American Association of Engineers.

May Pay Accounts at Any Branch Bank in Toronto

The Consumers' Gas Company of Toronto, Ont., reminds its patrons on the front cover of *Gas News* that payment of accounts may be made at any branch bank in the city. The company urges that they save time and car fare by making general use of this arrangement.

18 Per Cent. of All Gas Sold in Chicago Used for Mantle Lighting

U. S. Bureau of Standards Declares That with Uniform Gas Quality and Good Service Conditions the Usefulness of Lean Water Gas for Mantle Lighting Is Slightly Higher Than Rich Water Gas in Proportion to Heating Values

Impressed with the great importance of mantle lighting in Chicago, as is demonstrated by the fact that 18 per cent. of all the gas sold in the city is used for that purpose, the United States Bureau of Standards went into that phase of the questions propounded to it in connection with the present negotiations under way in regard to rates and standards with great care. In its report on the subject the Bureau declares as follows:

Importance of Adjustment in Using Rich Gas

In the use of gas for mantles the customer is not concerned with the candlepower of the gas; in fact, when the burner for mantle lighting is properly adjusted it practically destroys the open flame candlepower characteristic of the gas and gives a flame of substantially zero candlepower when the mantle is not in place. The heat given out on burning produces the incandescence of the mantle, to which the entire quantity of light is due.

The question to be answered is, therefore, does the heat available from the several gases serve equally well in producing incandescence?

Such comparison was first made to determine the relative efficiency in use of the heat when the lamps were operated under the best attainable conditions of adjustment as to gas rate, position of the air shutter, pressure of gas, etc. Then the influence upon the efficiency produced by changes in these conditions required investigation, since obviously in practice the lamps must operate under varying conditions both of supply and of adjustment.

Four styles of the high-grade mantle lamps commonly used throughout the United States (upright, inverted, Junior and C. E-Z.) were first examined; later some cheaper grades of lamps were tested. Comparisons were made between gases of higher heating value and those of lower heating value, both with mixtures resembling coal gas and those similar to water gas in composition.

Inspections of many lamps in actual service were also made to give added certainty to the conclusions.

Influence of Various Factors Upon Efficiency

The efficiency of a lamp under any condition is measured by the amount of light given out relative to the amount of heat liberated by the burning of the gas. Therefore, tests were made under the various conditions which it was necessary to study by determining the candlepower of the lamps and the heat supplied to them. In comparing the efficiencies of operation of a particular lamp on different gases, all observations were made as far as possible the same day to avoid the introduction of variables due to changing atmospheric conditions. While it was seldom possible to duplicate absolute efficiencies on successive days, it was found that relative results were usually quite comparable though irregularities at times occurred.

The general conclusions which have been reached from these experiments are briefly summarized as follows:

Pressure

With lean water gas at low pressures (below 3 in.) somewhat narrower limits of operation of certain of the lamps is found than with rich water gas or with lean coal gas. However, at pressures of 5 in. or higher, the reverse effect is noted. Taking these two opposing influences into account, the Bureau believes that under Chicago conditions little if any advantage of one kind of gas over another exists on account of the average pressure maintained.

Pressure Fluctuation

Increase or decrease in pressure, without change in the lamp adjustment, changes the rate of gas burning and therefore changes the efficiency of the lamp.

In general, when the rate at which a gas is burned is continuously increased, the candlepower and efficiency both increase up to a certain point, but beyond this the efficiency falls off. At a still higher rate of burning a maximum of candlepower is reached and further increase in rate of burning is accompanied by a decrease in candlepower as well as a continuation of loss of efficiency.

In practice it is customary to adjust lamps so as to bring them to the point of maximum candlepower. However, the experience of the Chicago company has led it to instruct its men to adjust the lamps so that slightly less gas than required for maximum candlepower is burned. This has the advantage of reducing the likelihood of carbon forming on the mantles; it also, incidentally, brings the lamps nearer to their point of maximum efficiency for the rich gas. Since the rates of burning maximum attainable candlepower and for maximum efficiency, which are approximately reached in practice by the two methods of adjustment described, are definite and comparable for one test with those for another, the Bureau has compared the various gases under these two conditions of adjustment. This investigation has developed numerous conclusions of technical interest; but for the present report only two of these need consideration, as follows:

In general, the decrease in efficiency from the point of maximum efficiency is slightly less rapid with lean water gas than with rich gas, especially when the rate of burning is too high for the best efficiency. For lean coal gas as compared with rich gas there is no advantage, but on the contrary perhaps a disadvantage in this particular.

Air Shutter Adjustment

One of the conditions that largely determine the efficiency of a lamp is the amount of air which is drawn into the burner and mixed with the gas before reaching the flame. Therefore, the position of the shutter which regulates the size of the air inlets on some types of lamps is of importance.

It has been found that with the rich gases the air ports should be wide open, therefore, and no skill is required in making this adjustment. With lean gas, however, the maximum efficiency is obtained with the

shutter partly closed. Hence some care in adjustment is desirable, although this is overbalanced by the resulting loss in efficiency when a maladjustment is made with rich gas.

Since with lean gas a faulty position of the air shutter results in relatively small loss of efficiency, and the difficulty at worst is a tendency of the lamps to "pop," or, in rare instances, to "fire back," the remedy for this should be obvious to most users of gas at once, and a correction readily be made by partially closing the shutter.

Such trouble would, therefore, seldom remain long uncorrected. On the other hand, with rich gas, if the shutter position is wrong, the result is generally a relatively large decrease in efficiency and a tendency to carbonize the mantles is found. From these facts, it appears that through the careless use of rich gas a somewhat greater practical disadvantage may result.

Comparison of Different Gases

It was found that different types of lamps differed in their relative efficiencies with different gases as indicated below. Cheap and higher priced lamps are grouped together, since about the same relative efficiencies were found with them.

Calling the efficiency (candles per B.t.u.) of a lamp operated at the point of maximum efficiency with a mixed gas of about 650 B.t.u. and 18.5 candlepower, 100, the relative efficiencies when using 565 B.t.u. water gas and operating the lamp at the point of maximum efficiency on that gas were about as follows:

Upright lamps	104
Inverted lamps	100
C.E-Z. lamps	100
Junior lamps	100

A similar comparison of these two gases, each used at its point of maximum candlepower, gave the following ratios for these lamps:

Upright lamps	107
Inverted lamps	104
C.E-Z. lamps	99
Junior lamps	99

The greater relative efficiency at the point of maximum candlepower with lower quality gas was due to the fact that in general the efficiency of a lamp decreased faster after the point of maximum efficiency was passed, with increasing gas consumption, when operated on richer gas than when operated on lower quality gas.

In another comparison, typical coal and water gases each of about 575 B.t.u. were used with the inverted and upright lamps. It was found that at the points of maximum efficiency as well as at the points of maximum candlepower the water gas showed an average of about 2 per cent. greater efficiency than did the coal gas.

The effect of using gas of very high candlepower was also investigated, and it was found that about the same efficiencies were obtained with this gas as with the gas of 650 Bt.u. and lower candlepower which was used in the comparisons described above.

Varying Gas Quality with Fixed Adjustment of Lamp

The results above reported apply to the condition of a uniform quality of gas; but in practice the heating value varies from day to day and from season to season. This fluctuation in quality is large when a high candlepower requirement, such as is now in force in Chicago, governs the manufacture; but when a heating value standard determines operation the unavoidable variations are smaller.

To study the influence of this variation in supply, tests were made by the Bureau with varying qualities of gas supplied in turn to a lamp without readjustment of the gas rate or the position of the air shutter.

It was found by these tests that the change of efficiency for any given change in B.t.u. per cu. ft. was generally greater with rich than with lean gas. This contributes to the greater uniformity of service experienced with lower standard, and some consideration must be given to this advantage in judging the relative usefulness in practice of the various gases.

From these results it is also concluded that a change from rich to either lean coal or lean water gas generally produces a marked increase in efficiency if the lamp remains adjusted for maximum candlepower with the richer gas. Thus lamps now so adjusted in Chicago may be expected to have a higher efficiency with the proposed lean water gas than now, if not readjusted at all.

Field Inspection of Mantle Lighting

In order to determine as fully as possible the extent of the influence of gas quality upon the condition of the mantles in use, members of the Bureau staff have examined more than 3,000 mantle lights in actual service in 10 cities, in some of which 22-candlepower gas is supplied and in others of which a lower standard prevails. In this work observations were made of the condition of the mantles, glassware, and pilot lights of the lamps and of the ceilings or shields above them.

This work was undertaken particularly to make clear the relation between results obtained in the laboratory and those obtained in practice. Mantle lights serve as the best guide for this purpose since inspection most readily reveals any defects which may exist due to improper or difficult operation. Moreover mantle lights are probably most affected by any such influences.

Two characteristics which might be ascribed to the quality of the gas are carbonization of mantles and smoking of ceilings.

Investigation of about 1,000 units in which gas of high candlepower was burned showed 17 per cent. of the ceilings with some indication of smoking; with about 2,150 units supplied with gas between 570 and 620 B. t. u., 17½ per cent. of the ceilings were so affected. For comparison of carbonized mantles only those units not regularly maintained by the gas company or lamp company representatives have been compared. Of the 700 mantles to which high candlepower gas is supplied, 4.1 per cent. showed carbonization; and, out of 1600 mantles to which leaner gas is furnished, it happened that exactly the same percentage (4.1%) were found carbonized. From these results and others obtained in the investigation it is concluded that no definite difference in conditions can be attributed to the quality of the gas supplied.

Although observations extending over a longer period, permitting a more detailed study of conditions, might perhaps lead to an indication of greater maintenance difficulties with a gas rich in hydrocarbons, yet it does not appear that a reduction in heating value is accompanied by any sufficient decrease in carbonization, increase in life of mantles, reduced adjustment

difficulties, or other improvements in service to be of importance in formulating the conclusion of this report. The difficulties commonly reported by gas company men may contribute to some increase in complaints or in the time required for lamp or appliance adjustment work, but such a factor would result only in a slight change in the cost of service, and that is not within the scope of this report to consider.

However, one very definite fact was established by the inspection, namely, that adequate maintenance is of considerable value as an insurer of good service to the customer. It has been amply demonstrated that, regardless of the quality of the gas, the condition of those lamps on company maintenance (i. e. regularly visited for repair, cleaning, and adjustment) is far superior to the condition of those not so cared for. It is, indeed, apparent that such regular maintenance affects the condition of the lamps to such an extent that the effect of all other factors is obscured.

General Conclusions Regarding Mantle Lighting

With uniform gas quality and with good conditions of service in other particulars, the usefulness for mantle lighting of lean water gas compared with rich water gas is slightly higher than in proportion to the heating values as given by the usual calorimeter measurements. Comparing lean coal gas with water gas of the same total heating value, the coal gas is slightly less useful, and this difference is about the same as the difference between the two qualities of water gas. Hence it may be concluded that the usefulness of a uniform quality of coal gas of 565 B. t. u. as compared with a uniform supply of water gas of 665 B. t. u. is substantially proportional to their relative heating values.

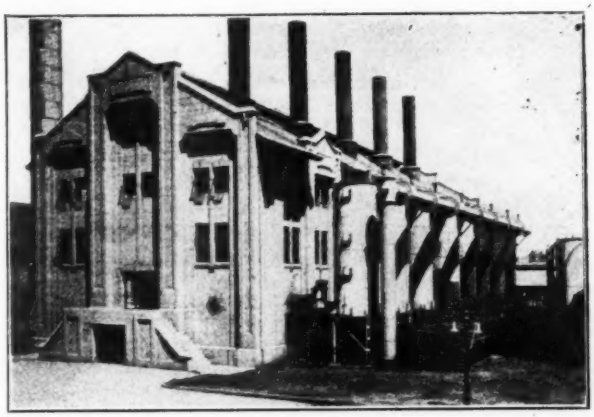
However, greater fluctuations in B. t. u. per cubic foot, slightly greater difficulties in adjustment, and the other factors discussed above make the present rich gas slightly less desirable per heat unit for practical uses than either lean gas. The Bureau therefore believes that the proposed lean water gas of 15 per cent. lower heating value will be from 10 to 12 per cent. less useful for mantle lighting per foot than the present supply; and that the proposed lean coal gas will be from 12 to 14 per cent. less valuable for this purpose.

These conclusions from the laboratory tests are probably applicable without modification to practical cases, since the field inspection of mantles has shown nothing to indicate greater difficulties in commercial use of rich gas than are met in the use of lean gas. With the qualifications noted in a later section, they are therefore so applied by the Bureau.

Once in Eight Years Sufficient to Paint Gas Holder

The publication *Graphite* calls our attention to an interesting long service testimonial which was received from the City Gas Works of Fredericksburg, Va. The letter follows:

"It gives us pleasure to state we have been using Dixon's Silica-Graphite Paint on our tank since it was built in 1905. When first erected it was given one coat of oil in the shops, and one coat of Dixon's Paint when completed. In 1908 it was given another coat, and again this year, making the time between painting eight years. When painted this year, the general surface was good, and only in a few places did it show any rust, and we freely recommend it."



NEW GENERATOR BUILDING

Oil-Gas Apparatus at New Plant at Portland, Ore.

Elmon L. Hall Discusses Variation in Methods of Manufacture and Gives Reasons Why His Company Adopted System It Did for Projected Plant

The production of gas from crude petroleum is essentially a process of high temperature cracking, declared Elmon L. Hall, chief engineer of the Portland (Ore.), Gas & Coke Company, in his paper on the new oil-gas plant of that company, presented at the annual meeting of the American Gas Institute. There has been much apparatus designed for this purpose but the variations can all be reduced with but few exceptions to construction details of size, form and dimensions, rather than to essential difference in the process.

We may repeat therefore that the oil gas production as a process, must be treated purely as an oil cracking process, subject to the same factors of temperature, pressure and contact with highly heated surfaces.

The gas-maker as a merchant must consider how to cheapen his product by all the manufacturing economies, among which the most important is the utilization of by-products. In other words, he strives to produce the greatest number of B. t. u. per dollar. This is true of all the gas-making methods.

This problem, from the standpoint of oil production has been attacked in two different ways:

By elimination of all by-products, *i. e.*, by conversion of all the raw material into gas.

By the production simultaneously with the gas of the largest amount of merchantable by-products on the theory that weight for weight the latter are worth more than the raw material.

The first method has been developed under the auspices of E. C. Jones of San Francisco. The process is of great theoretical interest, but unfortunately has not as yet evoluted to its maximum possibilities, *i. e.*, the complete elimination of lampblack as a by-product. The further development of this process to its logical end is hindered by the high standards of quality of gas prevalent in California, *i. e.*, a 600 B. t. u. or higher.

The second method is of more universal application and is exemplified in most of the coast cities in so far as the by-products are marketed, by Los Angeles, San Diego, Oakland, California, and Portland, Ore. Nearly all the other oil gas plants produce lampblack, but have not sufficient volume to briquette.

Will Pay to Produce By-Products Where There is a Good Fuel Market and Oil is Cheap

Both methods have their merits and their advocates and in the final outcome it will no doubt be found that local conditions will determine the process to be adopted.

Where there is a good fuel market and oil is cheap, it will unquestionably pay to produce by-products.

Investigations made by the Portland Gas & Coke Company, at the instance of the Bureau of Standards, showed that for our local conditions, a 525 B. t. u. gas would, if by-products were fully manufactured and sold, deliver to the consumer the most B. t. u. for a dollar. The present standard of 570 B. t. u. in force in the state of Oregon therefore represents, from a gas-making standpoint, an incomplete and wasteful process.

If, however, this standard were maintained it is interesting to consider what should be the composition of a gas produced from crude oil in order that the minimum percentage of the original carbon should be utilized in producing the necessary B. t. u. per cubic foot. Without going into the calculation, an analysis is given below of which a 560 B. t. u. gas containing the minimum carbon, and which would, therefore, produce the greatest amount of carbon residue per thousand cubic feet of gas.

This analysis represents a methane-hydrogen gas and is predicated on the assumption that the carbon dioxide and nitrogen will remain the same in volume, which is not necessarily the case.

The selection of oil gas apparatus for the new plant was further investigated relative to costs per 1,000 cu. ft. of daily gas capacity and it was decided that the installation costs for a single shell type per unit of gas-making surface were considerably lower—as was to be expected.

560 B. t. u. Gas with Minimum Carbon

CO_2	1.2
C_6H_6	None
C_2H_4	None
O_2	0.7
CO	7.2
CH_4	37.0
H_2	51.5
N_2	2.4
	100.0

Description of Oil-Gas Process

Before proceeding with a description of the gas apparatus, it may be interesting to some gas engineers to describe the oil gas process, by which the greater portion of manufactured gas on the Pacific Coast is procured.

Oil gas, while manufactured in apparatus and by a process somewhat similar to the manufacture of water gas, produces a gas strikingly characteristic to coal gas, as may be seen by the following analysis of that produced by the Portland Gas & Coke Company, for typical 570 B. t. u. oil gas:

Carbon dioxide	1.4
Benzene	1.4
Ethylene	3.1
Oxygen	0.2
Carbon monoxide	6.0
Hydrogen	52.45
Methane	28.3
Nitrogen	7.18
Gross B. t. u. calculated	578.5
Specific gravity	0.4135

A striking and essential difference in this process is the fact that the only important by-product is a large quantity of very pure carbon, comprising frequently as high as 50 per cent. of the weight of the original oil.

The principal problems arising in the manufacture of oil gas present themselves in connection with this residual.

Firstly: by reason of the mechanical difficulties introduced of cleansing of the gas and the recovering of this valuable substance.

Secondly: by the fact that there are produced with this carbon, varying amounts, of a very pitchy tar, with but very little commercial value, which, if allowed to condense, at the same time the lampblack is removed, produces a spongy substance most difficult to handle and which, in a short time, will completely block up the apparatus and passageways.

As is usual in manufacturing problems of this description, the means used by the pioneers of the art to handle this substance were both cumbersome and complicated. The writer has frequently seen plants in California and Oregon, where from one to five hours were consumed daily in ridding the washers and scrubbers of this accumulation. As the art progressed and the theory of oil gas condensing and washing was better understood, the apparatus was so designed as to mechanically and automatically separate the lampblack from the tar at appropriate stages in the process. The manufacturer is also troubled with the usual bugbears of naphthalene, cyanogen and sulphur, without the compensation of ammonia recovery, which substance is present in only the faintest traces.

Gas Generators

The five gas machines at the Portland plant have a capacity of generating 2,000,000 cu. ft. of gas per day. Each consists of a cylindrical shell 20 ft. in diameter and 30 ft. 6 in. in height, with a conical-shaped top 4 ft. high, all of which is constructed of ⅜- and ½-in. steel plating. On the sides near the bottom are two 36-in. diameter drums for the blast connections and in the rear is a 36-in. diameter off-take nozzle. Just above each of the two inlets are two 10-in. diameter nozzles for the gas-making burners.

Eight cast-iron manholes are distributed about the shell for access below the arches and to the checker brick, and on the top is a 34-in. diameter stack valve which operates by steam hydraulic cylinder.

Steam and oil piping connects to all of the burners, which are controlled from an operating panel located between each pair of generators. Here also are valves for operating the stack valve, gauges for all steam and oil connections and oil meters, and also hand-operating stands for the 24-in. diameter blast valves.

An all steel platform is provided around each generator for access to the gas-making burners and an additional platform at the top for cleaning the stack valve. Steel stairways lead to these platforms, all of which are equipped with pipe hand-rails and wire guards.

The lining of the generators is 16½ in. in thickness, consisting of 13½ in. of firebrick and 3 in. of asbestos. At the bottom, thirteen arches, 9 in. in width and hav-

ing an air space of 6 in. between, are installed for supporting the checker brick.

These arches span half the width of the machine and rest on the center on a wall, which extends entirely across the shell and the latter is provided with two small arches for permitting the air blast to get from one side of the generator to the other. The crown is composed entirely of wedge-shaped blocks, which are supported on large skew backs, placed on the top of the lining wall. Special shaped blocks are provided for the air inlet and off-take connections and also for the burners and manholes. The operation of these units has been so standardized by means of the improved construction that the life of the checker work is at least two years.

Wash Boxes

In the rear of each generator and just outside of the building wall are five wash boxes, each of which is connected to a generator by a 36-in. diameter pipe, which is firebrick lined and which reduces to a 24-in. diameter cast iron ell with clean-out doors at the wash box for connecting the dip pipe. The wash boxes are 8 ft. in diameter and 7 ft. in height, and are constructed of ¼- and $\frac{5}{16}$-in. steel plating. They are provided with hopper bottoms and are supported above the yard level on structural steel columns.

The dip pipe which is 24 in. in diameter, enters through the top and extends sufficiently into the wash box to insure a minimum water seal of 10 in. The lower part of this pipe is equipped with a flange or hood grooved for rotating the water and a suspended disc is provided for closing off the pipe.

The gas outlet, which is also at the top, is of the same size and has cast-iron ell and pipe for connecting to the primary scrubbers. Three connections on the top are made for admitting the water. These are arranged with a special shaped casting for spraying the water into the shell.

The overflow outlet is of cast iron and is riveted to the side of the shell. It is arranged with movable gate to allow raising the water seal and is provided with outlet pipe 10 in. in diameter. This pipe is sealed in a steel drain tank 4 ft. in diameter and 5 ft. in height, which is connected by means of a steel flume to an underground pipe line extending to the filters at the briquetting plant.

Other connections on the seal tanks include two cast-iron manholes in the sides and an 8-in. valve in the center of the bottom for cleaning purposes.

As a result of the improved construction the cleaning of wash boxes, scrubbers and seal pots has been entirely eliminated and the separation of lampblack and tar accomplished in two distinct stages, *i. e.*, lampblack is entirely removed in the wash boxes and the tar entirely in the scrubbers, thus allowing each constituent to be easily and automatically eliminated.

Primary Tar Scrubbers

One primary tar scrubber is provided for each generator. These are each 10 ft. in diameter and 28 ft. in height and are constructed of $\frac{5}{16}$- and ¼-in. steel plating. They have conical bottoms and are supported on the structural steel columns similiar to those of the wash boxes. The inlet and two outlet connections are 24 in. in diameter and the latter are so arranged as to permit the passing of the gas either to the secondary scrubbers or directly to the 36-in. diameter header leading to the relief holder. Water is admitted at the top by means of an " H " shaped spray and the scrubbers are drained at the bottom by a 12-in. diameter pipe, connected to and sealed in the primary tar boxes, without the use of the usual seal pots.

The interior of the scrubbers is equipped with five conical rings, which are riveted to the shell and five small cones, both of which catch the water and form a spray through which the gas passes.

Platforms are provided along the tops of the scrubbers and at the floor level, along the building wall, for access to the valves and for cleaning purposes. Steel stairways lead to all of these platforms and where necessary, hand rails are installed. For the large valves, extension stems are arranged for operating from the ground. Each scrubber is equipped with six cast-iron manholes for access to the cones and water sprays.

Final Cooling Scrubbers

Three final cooling scrubbers have been installed, one of which is arranged to handle the gas from each pair of generators. The shells and supports are identical to those of the primary scrubbers and also the water inlet and drain connections to the tar boxes. The inlets for each, of which there are two, are 24 in. in diameter and connect to the outlet of the primary scrubbers. The gas outlet is of the same size and connects to the 36-in. diameter header previously described.

There are cones in these scrubbers and the interior is filled with wooden trays, which are supported on steel angle irons riveted to the shells. The platforms, stairways, etc., are the same as those of the primary scrubbers.

The gas passes from final scrubbers to the relief holder whence it is drawn through the following apparatus.

Oil Scrubber

In common with the history of all gas plants, naphthalene troubles had occasionally made themselves felt, with this company, particularly after the introduction of oil gas and high temperature operation. Profiting, however, by the European experience in anthracene oil washing, which was readily understood to be merely a process of physical solution, experiments were instituted by the writer in 1907 and 1908, as a result of which an 8 by 30-ft. oil scrubber was installed at the old plant. About the same time a similar development occurred in the plant of the Los Angeles Gas & Electric Company and the technic of the process was worked out by Mr. Wade, chemist, and D. J. Young, superintendent.

As a result of this experience, crude oil washers 10 ft. in diameter by 30 ft. high, with automatic oil pumps and receiving tanks, were installed at the new works. Due to oil washing, naphthalene complaints are practically unknown. The four or five calls which are received per month from this source are derived mainly from oil deposits. The process has been well described in an article before the Pacific Coast Gas Association by Mr. Wade, in a paper entitled: " The Naphthalene Problem in Oil Gas Manufacture and Distribution."

The oil scrubber is 10 ft. in diameter and 30 ft. in height and is constructed of ¼- and $\frac{5}{16}$-in. steel plating. The gas inlet and outlet connections are 24 in. in diameter and the oil inlet, which at the top is 3 in. and the overflow at the bottom 6 in. in diameter. Oil is obtained from the main oil supply from the oil pumps in the pump house and the piping is so arranged as to permit using either cold oil or hot oil heaters for the generators. The 6-in. drain connections overflow into a steel tank 10 ft. in diameter and 10 ft. in height, which

is buried under the ground and which is prevented from overflowing by a 6 by 4 by 6-in. Blake-Knowles duplex steam-driven pump, operated automatically by a float in the tank. This pump returns the oil through a 6-in. pipe line to the oil storage tank.

The oil scrubber is provided with a vertical steel ladder, extending from the ground to the top, where a hand rail is placed. Three cast-iron manholes on the sides give access to the interior, which is filled with wooden trays, supported by steel angle irons riveted to the shell.

The effect of the crude oil washing is to dissolve out the naphthalene present in the gas, which is, however, not lost, since the oil is eventually used for gas making when the naphthalene is made into gas.

About 5 gal. of crude oil is made to circulate through the oil scrubber per 1,000 cu. ft. of gas made.

Purification

The gas, after being subjected to the oil washing, is drawn through the elsewhere-described exhausters and passes through a Gas Machinery Company multiple gas washer for final cleansing before purification. The crude oil from which the gas is made contains normally from ¾ to 1¼ per cent. sulphur, which quantity is responsible for about 180 grams of hydrogen sulphide for every 1 per cent. of sulphur in the crude oil. This amount is accompanied by about 15 to 20 grains of carbon bisulphide and other sulphur compounds.

Gas purification is entirely by means of the well known Lamings mixture with selected planning chips, as a coating medium. Purification expense with this material has been materially reduced during the last few years by studies on the preparation of same without losing a great portion of the valuable copperas in the interior of the chips. In other words, means have been found to keep the valuable artificial iron oxide almost entirely in an available state on the surface of the chip.

There is used for the purpose of manufacturing this substance, an apparatus somewhat on the principle of a concrete mixer set up on a high platform and served by a small elevator.

Purifying System

The primary purifiers, of which there are four, are 32 ft. in diameter and 20 ft. in height. Two of these were purchased from the Gas Machinery Company at the time the plant was constructed and the other two were moved from the old works on a barge. All are constructed of $\frac{3}{16}$- and ¼-in. steel plating and have spherical-shaped tops, and are designed for either simplex or duplex operation. The three inlet and three outlet connections are 20 in. in diameter, and are arranged one above the other with valves so that the gas may be passed through any section or all of the purifiers, as desired.

Steel "I" beams and columns on the inside are installed for supporting four sets of trays, on which the oxide is placed. The trays are of wood and are built in sections, so as to facilitate handling and dumping.

On the top of each purifier two asbestos sealed doors, 6 ft. in diameter and constructed of steel plating and angle irons are placed for installing the oxide and are provided with clamps for fastening and with chain blocks and overhead trolley for convenience in handling. On the sides for removing the oxide, are two doors 3 ft., 6 in. by 8 ft., 4 in. high, which are also of steel and are arranged with hinges, clamps and bolts for fastening. A 12-in. diameter blow-off valve is placed on the top of each purifier and on the side a 10-in. connection for air inlet. In the bottom is a 3-in. diameter drain connection, which is equipped with valve, funnel and strainer and piping connection to washer drain tank.

Between each purifier, at the top, a small platform is provided and a steel stairway extends to the ground. Along these and also around the top of the purifier steel pipe hand rails are placed. Most of the large gas valves are equipped with extension stems for operating from the ground and on the sides of the purifiers, where necessary, thermometer wells and test cocks are placed.

Two of the secondary purifiers were purchased from the Gas Machinery Company and are identical to the primary purifiers. One other secondary purifier, which was moved down from the old plant is 2 ft. greater in height, but otherwise practically the same, except in the general construction where much lighter material was used.

In addition to having all of the connections, etc., as described, for the primary purifiers, the secondaries are equipped with steam heating coils located in the bottom. These consist of 2-in. piping spaced about 6 in. on centers and extending entirely across the interior of the shell, and arranged with steam inlet and outlet connections, on the outside.

For reviving the oxide in the purifiers, a No. 9 Sturtevant steel pressure blower has been installed in one corner of the oxide and shavings storage building. It is direct connected to a 20-h.p. Form K. Type 1-8—900 r. p. m. induction motor, and has piping connections 16, 14 and 10 in. in diameter, extending to each of the purifiers.

Organic Sulphur Removal

It has just been mentioned that the organic sulphur present in the oil gas is about 15 grains per 100 cu. ft. This amount, while noticeable to consumers, has not heretofore been considered poor practice by the fraternity. Such is not the case, however, when the sulphur amounts up in the raw material to 2 or 3 per cent., or even as high as 4 per cent., since the organic sulphur amounts up in proportion and reaches a quantity as high as 60 grains per 100 cu. ft., at which point the gas is unfit for domestic use and many other purposes.

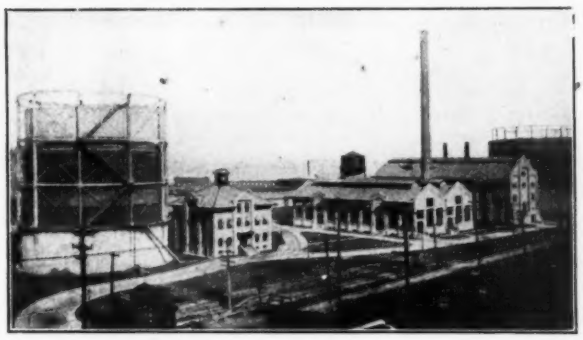
This condition was experienced by the Portland Gas & Coke Company soon after changing over to the oil gas and would have barred out that process entirely, if means had not been discovered for eliminating this impurity.

The process consists essentially of purifying the raw gas from hydrogen sulphide and raising same to a temperature from 900 to 1,200 deg. Fahr., thus breaking down the organic sulphur to hydrogen sulphide, cooling the gas and then again passing the same through a set of purifiers, to eliminating the hydrogen sulphide produced.

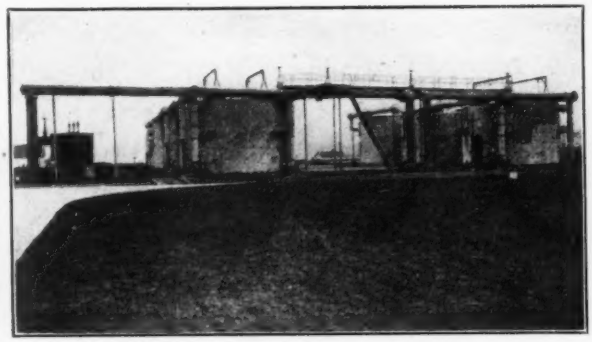
The reaction is a simple mass action in which the original sulphur distributes itself between hydrogen and carbon combinations reaching an equilibrium at a certain proportion of hydrogen sulphide and carbon bisulphide.

The same equilibrium is destroyed by the removal of the hydrogen sulphide in the primary purifiers so that when the temperature of reaction is again restored and mass action equilibrium is again established, the organic sulphur is redistributed between hydrogen and carbon radicals in the same proportion as in the primary reaction, thus producing a new amount of hydrogen sulphide, susceptible of a removal by iron-oxide purifiers.

The preheating apparatus at the old plant being new



BUILDINGS AND GROUNDS OF NEW PLANT AT PORTLAND, ORE.



PURIFYING PLANT AT PORTLAND, ORE.

and of the proper size, it was removed to the new plant and installed in the generator house.

Reheating System

The two reheaters have a combined capacity of 4,600,000 cu. ft. of gas per day. They were originally located at the old plant and after being dismantled were moved to the new plant on railway cars and re-erected.

Each consists of a cylindrical shell 10 ft. in diameter and 35 ft. in height, and constructed of $\frac{5}{16}$ and $\frac{3}{8}$ in. steel plating. Near the bottom of each is a 30-in. cast iron nozzle with hot valve for natural draft while heating, and also a 20-in. diameter connection with valve for the gas inlet. At the top is placed a 30-in. steel tee, which is firebrick lined, upon which the 20-in. cast iron stack valve rests. The gas outlet is off the side of this tee and consists of 30-in. steel pipe, also firebrick lined, and which reduces to 20-in. diameter cast-iron, with clean-out ell and dip pipe to wash box.

The stack valve of each is operated from the main floor by a hand gear and connecting rod. A steel stack 5 ft. in diameter and 20 ft. in height is provided for each machine and is supported from the roof trusses, the same as those of the generators. The burners, of which there are four, are on the side near the bottom and each is equipped with control valves, gauges, etc. Several cast-iron doors also on the sides give access below the arches and to the checker brick filling.

The lining is 16½ in. in thickness and consists of 15 in. of firebrick and 1½ in. of asbestos fiber. It extends the entire length of the shell and is corbelled in at the top to form a crown and to support the lining in the 30-in. steel tee. Two sets of arches, with air spaces between and located one near the bottom and the other about half-way up the shell, are installed for supporting the checker brick.

The wash box, which is used in connection with both reheaters, is 8 ft. by 14 ft. in plan and 8 ft. in height. It is constructed of $\frac{3}{8}$-in. steel plating and is elevated on a steel platform, between and near the top, and supported from the reheater shells. Water is admitted through eight sprays distributed on the sides, and the overflow consists of a cast-iron box and 10-inch. pipe, which is sealed in a drain tank resting on the generator room floor. The two gas inlet connections enter at the top and are provided with 20-in. diameter dip pipes. The gas outlet, which is also at the top, is of the same size and extends to the condenser, which is located just outside of the building.

The gas condenser was moved from the old works on a barge, with the purifiers. It is 12 ft. in diameter and 22 ft. in height, and consists of a steel shell of $\frac{3}{8}$ and $\frac{5}{16}$-in. plating. It is provided with two $\frac{3}{8}$-in. tube sheets and 1,012 2-in. diameter boiler tubes, 18 ft. in length. The gas inlet is at the top and the outlet on the side near the bottom, both of which are 20 in. in diameter. The water inlet is 6 in. in diameter and the drain connections to the sewer are 8 in.

Station Meter and Works Holders

The gas, after purification, is measured in a station meter having a capacity of 4,152,000 cu. ft. of gas per day. It is 16 ft. in diameter and 16 ft. long and has 24-in. diameter piping connections. It is a standard type, manufactured by the Charles H. Dickey & Company of Baltimore, Md., and is equipped with a cast-iron casing, Hinman Drum and usual accessories.

The foundation consists of four concrete piers, one under each cradle. These piers are 2 ft. 6 in. by 13 ft. at the base and extend 5 ft. below the floor line.

The relief holder, which has a capacity of 680,000 cu. ft., has two lifts and is provided with new steel tank 113 ft. in diameter and 37 ft. in height. The holder was originally located at Thirteenth and Couch Streets, and installed in a concrete and brick tank. It was dismantled and re-erected, using practically all of the old steel sheets and guide frames, and provided with new steel tank and stairway, extending to the top of the frame, which is 109 ft. in height. The holder is equipped with hand rails on all stairways, along the cups and around upper lift and a Cutler's anti-freezing device is installed for protection in cold weather.

The foundation, consisting of concrete mat 4 in. in thickness at the inside and 12 in. thick around the outside, extends about 4 ft. beyond the tank shell, forming a walk entirely around the holder. The outer edge of this walk is shaped into a gutter, which is arranged with sewer drains, the whole of which is similar to that of the storage holder. Concrete pits are provided for the inlet and outlet connections, including large gas valves and drip pots. Around these, hand rails are installed, and where necessary steel platforms are placed for operating the valves.

The storage holder, having a capacity of 505,000 cu. ft., has three lifts and is provided with a steel tank 94 ft. 6 in. in diameter. A steel stairway extends to the top of the guide frames, which are 111 ft. in height and hand rails are placed on all stairways, along cups and around upper lift. The holder is equipped with Cutler's anti-freezing device.

(*Continued on page* 158)

AMERICAN
GAS ENGINEERING JOURNAL

FIFTY-EIGHTH YEAR

Published Weekly by
AMERICAN GAS LIGHT JOURNAL, INC.
42 Pine Street, New York, N. Y.

ELBERT P. CALLENDER, President
STANTON G. KRAKE, Vice-President
FREDERICK A. SOUTHWORTH, Secy.-Treas.

EUGENE C. MILES, Editor

Subscription, $3.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.
In Canada, $4.00. Foreign, $5.00

Entered at the Post Office, New York City, as Second Class Matter.

CONTENTS

Gas Equipment for Railroad Shops, By W. F. Clausen 147
18 Per Cent of All Gas Sold in Chicago Used for Mantle Lighting 149
Editorials 156
Surplus Lean Gas from By-Product Ovens for Industrial Fuel 160
Seattle Electric Plant Abandons Effort to Obtain Heating Business 161
Everett Gas Company Plan Continues to Lure Consumers to Gas Office 161
Publications 161
Patents Pertinent to Gas Industry 163
News of the Gas Industry 165
Personal Notes 167
Societies and Associations 168
Construction Notes 168
Financial Notes Will Be Found on Page 16 of the Advertising Section.

The Great Cost of the Open-Flame Burner

What has the continuance of the open-flame burner cost the gas companies of this country? A great deal more, doubtless, than it would be comforting to estimate.

Its effect upon the adoption of the heat unit standard alone is enough to furnish us an index as to what its magnitude would be. The discussions still under way in Chicago have emphasized this factor strongly.

Exclude that large number of patrons who still use open-flame burners in that city and how much easier it would have been for the People's Company to have secured the adoption of the quality standard which is undoubtedly its due? But personal selfishness has entered, and politics have beclouded the issue simply because the number of such gas users is so large. How much money would this company have saved in publicity and other work to educate the people of its city as to what does constitute good gas for present-day conditions?

So it has been in every effort to extend the adoption of the heat unit standard. The candle power standard is a relic of the open-flame burner. Eliminate the latter and the abolishment of the former will be simple in accomplishment.

Doubtless there are many ways in which this elimination may be attained. The most direct way, however, must of necessity be the best. We must make it easy for consumers to obtain mantles and the necessary equipment for using them.

The people of this country prefer to pay their taxes indirectly. Artificial lighting has become so cheap and so common as to be a necessity. Instinctively we look upon the costs of our necessities in much the same manner as we look upon taxes. The method of including the cost of lighting installations in the monthly charge for gas would, therefore, seem well adapted to securing the elimination of the open-flame burner.

The College Graduate in the Gas Business

Possibly the assertion that gives those critics of the gas man, who apparently find considerable gratification in comparing him adversely to men engaged in similar or competing industries, the greatest satisfaction is that which calls attention to the large number of men in executive posts who have not had the advantage of a college education.

Within the past few weeks a member of the staff of this journal had occasion to visit a gas man, who is a particularly striking example of the type which has worked its way up from the ranks. He started in a grade even below that of day laborer, and at an age that would imply that his educational disadvantages were not limited to the lack of a college education, but to a certain lack of even elementary education as well. Yet this man has attained the post of general manager of a

large company, and, to all outward indications, is succeeding very well in the discharge of the duties of that office.

He is essentially one of the broad-gauged men of the industry, quick to take up new ideas, and in rounding them out and perfecting them. Besides, though this is apart from the gas business, he has attained prominence in civic affairs, is connected with banking interests and well versed in financial matters.

Such a man would seem an anomaly, but a consideration of his habits will reveal that he is nothing of the kind.

It is not necessarily to be expected of him that he would devote a considerable part of his time—his own time, by the way—to reading, which, while it will have a great value in rounding him out individually, and in developing his mind, has little or no bearing on gas. Yet so wide is the scope of this man's interests, and so broad the range of the literature he has made his, that our staff member was astonished. This gas man is not parading the streets flaunting the fact that he has attained the post he has without a college education. He realized while still quite young that his lack of it was a serious disadvantage, and he diligently set to work to supply the deficiency, in so far as he could, by other means.

This matter of the necessity of a college education to a man engaged in technical pursuits has been considerably discussed, yet there still remain many believers in it and many disbelievers. This journal believes that if the gas man we have reference to had had the advantage of a college education, and had not attached an undue weight to the advantages it had given him—had, in fact, applied himself since, say the age of twenty-three, with the same degree of application in broadening his knowledge as he has up to the present that he would be to-day much in advance of his present mental plane. The weak point in the assumption, however, is that, perhaps, he might not have done so.

It is quite likely that he magnified in his mind the disadvantages he was laboring under in regard to education and has been developing his mind at a forced draft ever since. If he had had the confidence the possession of a college education gives he might not have been so assiduous in his quest of knowledge.

This journal does not decry the advantage of a college education. It firmly believes that no gas man or any other man can ever hope to acquire more knowledge than he can to very good advantage use in his work.

It declines, however, to worry itself to any extent of this so-styled weakness of the gas industry. The average man is going to be a capable man very much in proportion to the amount of effort he puts into the task of making himself capable. If he has had educational advantages the task will be just that much easier. If he has not, it will be just that much harder. In either case he can attain the same object if he lives long enough, and is willing to pay the price.

House Heating

The person who lives in a house or a flat with perfect heating equipment is indeed fortunate. There are very few, if any, such people. The flat dweller is constantly complaining about the lack of heat. The house dweller usually finds that some days the draft is so strong that it is hard to keep the house cool enough, while on other days it is hard to keep it warm enough. Then there are always rooms that do not heat satisfactorily when the wind blows in certain directions. There seems always to be some trouble. The oil stove manufacturers are doing their part to make these people comfortable by spending large sums of money in picturing the solid comfort to be derived by using an oil stove in any room that is not warm enough.

Is the gas industry doing as well as the oil industry in this respect? There is no question about the gas heater being a great deal more convenient and a great deal more satisfactory than the oil heater. Is the gas industry telling the public enough about this fact?

There is no load that is easier to develop than the auxiliary heating of homes. There is possibly no use of gas that gives better results. We have now on the market, room heaters of all descriptions. Some of these burn with a yellow flame while others use bunsen burners. Some use different substances for radiating the heat, while others rely on the low temperature of the flame to accomplish the desired results.

Very ornate and expensive heaters are manufactured, and very cheap and ordinary looking heaters are made and sold. There is scarcely any requirement that cannot be satisfactorily met with gas heaters. This is not true of oil heaters. There are only a very few types of oil heaters made, yet they are now being given more publicity than the more effective and more convenient gas heaters. Can the gas industry allow this state of affairs to continue? Would it not be wise for all gas companies to pay even more attention to the sale of gas heaters than they are at present?

There is every reason to believe that the next field that the gas industry will develop extensively is the field of house heating. The present practice of burning coal to heat houses is not efficient. All the by-products are wasted and a very large percentage of the heat passes up the chimney. Besides, this coal is dirty and annoying to the householder. He would welcome a cleaner and a more convenient fuel. Since the use of gas in all places where raw coal is now burned would prolong our coal fields for thousands of years this is a very important question.

A good way to encourge people to heat with gas, a good way to begin the development of this market for gas, is to persuade them to use gas for all their auxiliary heating.

(*Continued from page* 155)

The foundation, which is 4 in. thick on the inside and 12 in. thick around the outside, extends about 4 ft. beyond the tank shell, forming a complete walk entirely around the holder. At the outer edge of this walk, a concrete gutter is placed and is provided with sewer drains. The inlet and outlet pits are of concrete and are of sufficient size to receive the drip pots and large gas valves. Hand rails are placed around these pits and steel platforms for operating the valves.

Gas Compressors and Transmission Line

Since the gas works are located some 7 miles down the Willamette River from the heart of the business district, it is of course not feasible to supply direct to the low pressure systems from the works holders. It is therefore possible and likewise advisable to transmit the gas from the generator station to the outlying storage holders at higher than street pressures.

Calculations as to the growth of the city and the direction of growth furnished the basis for estimating the pumpage for a period of years. The size of pipe line was therefore selected in which the operating costs for pumping together with the fixed charges for investment would reach a minimum, after a period of a few years. The exceedingly low cost of producing power at the works and consequently costs of pumping made it possible to materially increase the pumping pressure and correspondingly decreasing the size of the pipe line. The calculations which were elaborate, indicated an initial pressure of 7 lb. for pumping through a pipe line 16 in. in diameter to be the most economical. It was further indicated that when the growth of the company should necessitate a pumping pressure of 16½ lb. it would be economical to relay the transmission line.

Gas Compressors

The two compressors are duplex cross compound rolling mills Corliss units, manufactured by the Laidlaw, Dunn, Gordon Company of Cincinnati, Ohio, and have a displacement of 5,600 cu. ft. per minute, at 106 r. p. m., which is equivalent to an actual guaranteed capacity of 5,200 cu. ft. at 94 per cent. volumetric efficiency at a mean pressure of 11 lb. The high pressure steam cylinder is 13 in. in diameter, the low pressure cylinder 25 in., the gas cylinders 31 in. and the common stroke is 30 in. Both compressors are equipped for lubrication, with central glass oil reservoir, which is connected to the various lubricating points by brass piping and furnished with sight feed oilers. A governor is installed on the main steam connections and relief valves on the steam cylinders.

The foundation for each compressor consists of a concrete block 14 ft. 6 in. by 24 ft. 1 in., in plan, and which extends below the basement floor.

The compressors are arranged to be operated either condensing or non-condensing. Each is equipped with a Worthington cylindrical condenser having 600 sq. ft. of cooling surface and a single horizontal, direct action wet vacuum pump, having cylinders of the following dimensions: 8-in. diameter steam; 12-in. diameter air, and 4½-in. diameter water and a common stroke of 12 in. The condensers have a capacity each of handling a maximum of 7,500 lb. of steam per hour, when provided with 500 gal. of water per minute at 65 deg. Fahr., and the pumps, of displacing 50 cu. ft. per minute at 45 strokes, or maintaining a 30-in. mercury vacuum in conjunction with the condensers. Both condensers and pumps are provided with gauges and thermometers, and the pumps with force-feed mechanical lubricating systems and other accessories for convenience in operating.

Auxiliary Equipment

For furnishing air to the oil-gas generators in connection with the heating process, it was decided to discard the positive-pressure type which had heretofore been in use for that purpose and substitute for the same the fan type. The reasons for this step were numerous. They may be tabulated as follows:

Adaptability to the electric drive.

Elimination of noise.

Ability to shut off air flow at generators suddenly without dangerous results to the machinery or the use of uncertain relief devices.

Lower first cost.

The realization that a sufficient volume of air for combustion could be delivered in the usual manner and at equal constancy, at a considerably lower pressure than commonly employed and well within the limits of efficiency of a fan by the proper designing of air ports on the generators and the necessary air connections.

The General Electric Company having produced, about this time, their centrifugal air compressors, it was decided that this unit came nearest to realizing the advisability of compromising between the two types and was for this reason selected.

The four blowers are of the centrifugal type, two of which have a capacity each of delivering 7,200 and two each of 15,000 cu. ft. of air per minute. They are manufactured by, and direct connected to General Electric Company Type 12, Form K, 3,600 r. p. m. induction motors, 50 h. p. for small blowers and 120 for large blowers. Each blower is controlled by a secondary switchboard near by and this consists of a pipe frame work, supporting the compensators, oil switches, etc.

Exhausters

The same general comments, which have been made on the pressure type of air blowers, applies very well for the selection that was made of the exhausters. It was, however, with some misgivings, that this type was installed for obvious reasons in connection with machinery of such small clearances and danger of stoppages. Our apprehensions, however, were entirely unfounded. This apparatus was operated with the most gratifying success since its installation, when it is realized that these exhausters have never been apart for cleaning in the three years since their installation. We have, on one occasion, for the purpose of easing our doubting minds, taken them apart, but this would not have been necessary.

In addition to serving the purpose for which it was installed the centrifugal exhauster has likewise achieved a conspicuous and lasting place as a final tar extractor, to the extent of rendering entirely superfluous the multiple gas washer installed as a final cleaner, immediately ahead of the purifier.

The two exhausters, which are of the General Electric Company's make, are of the centrifugal type and have a capacity each of handling 5,000 cu. ft. of free gas per minute, against a normal pressure of 0.625 lb. per square inch. Each is direct connected to, and mounted on the same base plate with a 75 h.p. Type "I," 2-pole 3,600 r. p. m., 440-volt induction motor. The inlet and outlet connections are 14 in. in diameter; for cleaning purposes, while operating, connections for inserting steam for loosening the tar, have been installed, and for further cleaning and for access to the

inner parts, one side of the exhauster shell is made removable.

Each exhauster is controlled from secondary switchboard located near by and this consists of a pipe frame work, supporting the compensators, oil switches, etc.

Water Pumps

It can be easily realized from the remarks made under the description of the oil-gas process, regarding the essential necessity for the separation of carbon from tar pitch, that the water supply for an oil gas plant is the one item most deserving of attention.

Due to experience at our old plant, located in the heart of the business district, contiguous to the mouth of sewers and subject to the flotsam and jetsam from the wholesale district, an earnest effort was made at the new plant to overcome these conditions. Studies, which were undertaken prior to the designing of the new works apparatus, showed over 75 per cent. of the stoppages in operation to be due to a failure of the water supply. The pump house, which has been elsewhere described, was located as near to the river front as the soil conditions would permit. It was necessary to anchor this building to piling and to weight same down by a heavy mass of concrete to prevent flotation at periods of high water. At the same time it was necessary to thoroughly water-proof the building, since at various seasons of the year the operating units would be at a level considerably under that of the river. It was at once realized that a structure of this kind would be exceedingly expensive per square foot of floor space. It was, therefore, decided to double deck the machinery and likewise to locate same diagonally with respect to their suctions in order to economize space.

The lower deck was reserved for the water pumps, of which there are two installed, with room for two additional. The upper deck was for the use of the oil pumps, since the pump house is located in close proximity to the 55,000-barrel oil tank, and also because this weight of machinery insured additional stability to the building. Both stories are reached from the ground level by iron stairways and a crane pit. The latter insured easy removal of machinery and parts for repairs, and consists of an I-beam at ground level, carrying chain blocks and trolley. Second, of an I-beam on the basement floor with a similar trolley. This second beam is hinged in such a manner that it can be swung to one side after the weight has been taken up by the upper chain blocks, to allow egress of the machinery.

The circulating water required for the condensers, scrubbers and other machinery about the plant is furnished by two 10-in. Jeanesville double-suction volute pumps, located in the pump house. They are equipped with bronze impellers and each is direct connected by means of a flexible coupling to a 100 h. p., Form K, Type "I"-6, 440-volt, 1,200 r. p. m., alternating-current electric motor.

Oil Pumps

For supplying fuel oil for the gas generators and boilers, in the pump house are installed 4-in. by 12-in. duplex oil pumps, as made by the Dean Steam Pump Works. These have cylinders of the plunger valve pattern and parts exposed to pressure are subdivided as much as possible in order to overcome the necessity of replacing the entire parts. The pumps are each gear connected to one 10 h.p., Type "I"-8, Form K, 900 r. p. m., 440-volt, alternating-current motor, and are equipped with gear covers, lubricators and other accessories.

In the pump house for removing the drips, drains, condensation and other leakages, a 1-lb. centrifugal pump, as made by the Henry R. Worthington Company, and having a capacity of delivering 50 gal. of water per minute is installed. It is direct connected to a 1 h. p., Form "C," Type K. T. 4, 440-volt, 1,800 r. p. m. electric motor, and is arranged to operate automatically with a float valve and switch.

Oil Storage Tank

The oil storage tank is 116 ft. 6 in. in diameter and 30 ft. in height, and has a capacity of 55,000 barrels. It is constructed of steel plates ranging from 3/16 in. to 9/16 in. in thickness, and is provided with a roof of No. 22 gauge steel, which is supported by wooden columns, rafters and sheathing from the inside. It is equipped with 16-in. diameter swing pipe, which is operated by hand winch for the pump section and a 10-in. pipe line entering through the top, admits the oil from the steamers. A steel ladder gives access to the roof and a gauge consisting of glass tubes, vernier and scale, is installed for measuring the oil.

The foundation consists of a concrete mat 18 in. in thickness at the center and 24 in. around the outside. It extends beyond the steel work a distance of 5 ft. 9 in., entirely around the tank, and provision, consisting of steel tie rods, extending up around the outer edge, has been made for the future installation of a concrete wall around the tank, as a precaution in case of leakage of the tank shell or piping connections thereto. As the tank rests on the low ground outside of the bulkhead, where it is surrounded by water during the high water season, in order to take care of any settlement or washing out of the sand, and in event of installing a concrete wall to prevent the tank wall and foundation from being floated away, 470-40-ft. piles were driven and these were securely fastened to the concrete mat by means of steel anchor bolts and tie rods.

One hundred eighty-six 40-ft. piles have also been driven for the future installation of a 15,000 barrel oil tank, which is now at the old works, but the concrete for the foundation has not been placed as yet.

Water Tank

The water tank, which has a capacity of 100,000 gal., is erected on a steel tower, 50 ft. in height. It is 28 ft. 8 in. in diameter and 16 ft. high, and is arranged with eliptical bottom and 3-ft. diameter settling drum, extending to the ground. The tank is constructed of steel plates ¼ and 5/16 in. in thickness and has a conical roof of ⅛-in. plates, supported on steel framing. The tower consists of 12-in. channel columns, securely braced with struts and diagonal tie rods.

A steel spiral stairway, having ornamental iron hand rails and winding around the mud drum, gives access to a balcony with similar hand rail, which extends entirely around the bottom and, to prevent the tank from becoming full to overflowing, a 20-in. diameter overflow pipe has been installed. The water inlet pipe is also 20 in. in diameter, and extends up into the mud drum a distance of about 5 ft., thus forming a settling basin around the pipe and for draining off the mud, a 6-in. diameter blow-off valve, with connection to sewer, has been provided.

The foundation consists of five concrete piers, one for each of the four columns and one on which the mud drum rests. These piers extend into the ground a distance of 6 ft. and are 13 ft. square at the base.

Works Connections

The large gas piping connections from the generators to the relief holder are 42 in. in diameter, from there to the exhausters, 36 in. and 30 in. to the purifiers, storage holder and compressors. Overhead piping is made of riveted steel and underground work is hub and spigot cast iron with lead joints, all of which has been tested with an air pressure of 50 lb. per square inch.

The oil line from the dock to the oil storage tank is 10 in. in diameter. At the dock, connections are arranged so that the vessels can unload the oil at any stage of the river. From the tank to the pump house, the line is 16 inches in diameter, made of outside diameter tubing, having welded joints, and branches from this consist of standard pipe and fittings. All high pressure oil piping is built for a working pressure of 250 lb. and have been tested to 300 lb. hydrostatic pressure.

All oil pipe lines under ground are covered with burlap and asphaltum, and lines for hot oil have two layers of 85 per cent. magnesia pipe covering.

The water-main line from the pump house to the condensers and water tank is 20 inches in diameter. Branches from this extend to all buildings and machinery and also to twelve fire hydrants, distributed about the plant. Water lines outside of the buildings, consist of steel outside diameter tubing connected together with couplings, made by the S. R. Dresser Manufacturing Company. All water lines are built for and tested to a hydrostatic pressure of 125 lb. per square inch.

From each primary and secondary tar box a 6-lb. pipe connection with gate valve is made and these are connected to an 8-in. main header, which extends to the tar pumps. From there a 6-in. line runs to the tar storage tank and a 4-in. line thence to the briquetting plant. All tar lines are designed for a working pressure of 125 lb. per square inch.

Power Plant

Under consideration for a prime mover were steam, steam-electric, gas, gas-electric and oil.

On account of the small size of the various units, which would not permit the use of high efficiency engines, and would necessitate long and scattered steam mains, no consideration was given to the individual steam drive.

Steam-electric involved the substitution of motor-drive for steam-drive, around the plant and a generation of current in situ from oil-fired steam boilers. This method was finally selected on account of cheapness of cost of construction and operation and flexibility.

The individual gas-drive was not considered for the same reasons as the individual steam-drive.

The gas-electric drive presented the most powerful inducements. It was felt, and is still, by the company that the gas-electric drive together with utilization of the exhaust heat for the production of steam, will eventually, by the high combined thermal efficiency, be adopted as the logical source of power for a central station gas plant. Unfortunately at the time this question was being considered and possibly even yet, sufficient practical progress had not yet been made in the utilization of exhaust heat for a plant of this size to be designed on other than experimental lines. Reluctantly, therefore, other prime movers were considered.

Diesel oil engines were given very considerable attention as a source of power, principally as on account of very low operating expense, construction costs were, however, at this time so high as to bar consideration of this type. Investment charges more than offset the operating economy. Moreover, the oil engine had not yet settled down to a standard design or a high degree of operating reliability.

Correspondence

Surplus Lean Gas from By-Product Ovens for Industrial Fuel

Sir:—In your recent remarks on the recovery coke oven, in its relation to the gas industry, I do not observe any reference to certain methods now being practiced in coke oven plants, which I believe are destined to affect very materially the gas business of the future. If the subject has been discussed recently in association meetings or in the technical press, it has escaped my notice.

I refer to the practice now in vogue in coke oven plants of separating the gas made in the first part of the period of carbonization from that made in the second part. This is practised more especially where part of the gas is sold to gas companies. The first, or rich gas, is sold to the gas companies, and the second part is now being stripped of its heavier hydrocarbons, the ammonia recovered by direct washing with sulphuric acid and the gas itself burned under the ovens. It is conceivable, however, that in some plants the volume of lean gas may be more than sufficient for the ovens, and I know of one instance where it is being sold in great quantity to an industrial concern.

The possibilities which these methods suggest are manifold, and I am going to mention some of them. Under such a system, gas for industrial purposes could be sold at much cheaper rates without disturbing the relations of the gas companies with their household consumers. Lean gas is more useful in industrial business than rich gas, owing to its higher flame temperature caused by the less volume of air required for its combustion. Lean gas can be delivered without loss from condensation at a higher pressure than that used for household purposes, thus reducing the capitalization required for distribution, while increasing the efficiency of the burners and rendering flameless combustion possible.

It might be objected that this would call for a duplication of the distributing plant, but this would be the case only to a limited extent, seeing that the tendency of our large cities is to bunch the factories into one particular district, while it is a fact that if the industrial business is to expand, as the prospects now are, a duplication or enlargement of the distribution plant will be absolutely necessary. For these and other reasons, I hold that the present method of supplying the industrial and household business out of one pot is illogical and will have to be abandoned.

Another branch of business in which lean gas can be advantageously used is where it has to be compressed for conveyance to distant points, either by pipe line or tank car. A gas that suffers by compression cannot be profitably used in such business. When we hear of the proposition in Europe to use gas in automobiles at a compression of 121 atmospheres, the need of a lean, practically uncondensable, gas is at once evident. The separation of the first and second period gas could be accomplished in some of our larger gas works without

great additions to the plant. In coke oven plants it is arranged by having two hydraulics with separate off-takes and exhausters, the switching from one hydraulic to another being done by butterfly valves. In works having a number of holders, a complete duplication of the condensing, scrubbing and purifying plant would not be necessary, as certain of the holders could be used as relief holders and the rest of the plant used to deal alternately with the rich and lean gas. Of course, in the former case the stripping plant would have to be by-passed.

This may have all been discussed before, but the ideas have been independently conceived by me, and, if they are good, they will not suffer from repetition.

Yours very truly,
JAMES FERRIER,
Rome, Ga.

Seattle Municipal Electric Plant Abandons Effort to Obtain Heating Business

SIR:—I notice in your issue of Jan. 1, that you have an article on electric heating from our municipal plant. I do not think that they are making any progress in the heating line; in fact, believe they have practically abandoned it. They admit that they cannot make a satisfactory rate. They are, however, making progress in domestic water heating and domestic stoves.

In those few cases where they have tried the heating they have shown the courage of their convictions to the extent that they have not demanded a premium for heating your premises. They have met the solid fuel rate and acknowledged their defeat.

Little is being done with gas as a heating medium in the Pacific Northwest; we hope that it will take on life in the near future.

Yours very truly,
THE BABCOCK-WIDHOLM SYSTEM,
By E. B. BABCOCK.

Everett Gas Company Plan Continues to Lure Consumers to Gas Office

SIR:—I noticed in the *American Gas Light Journal*, issue of Nov. 6, on page 300 an article "Luring Consumers to the Gas Office." I wrote this article shortly after last Easter and thought you might be interested in further results from this plan.

But little was done during the summer, but in early fall a letter was sent to each church and charitable organization in the city calling their attention to the continuance of the plan and bidding them welcome to use the front of the office for the sale of food stuffs, etc. To show how popular this has proven itself to be, there have only been three Saturdays since the first of September that have not been used. One church asked to have the office every Saturday during the entire winter, a favor, which, of course, we were not in position to grant them and still play fair with the other churches.

Besides the churches making use of the office the ladies of the City Beautiful Committee used the office three days for the exhibit of trees and shrubs, which they were offering for sale at very low prices. These low prices were obtained by the fact that the offer was open to all Everett citizens and quite a number of orders were taken. As this was a community idea much publicity was given it in the newspapers, and as a result many people who were totally strange to us visited our office and, of course, could not help but notice the ranges, water heaters, etc., that we had on display.

Besides the advertising value of this to a gas company I believe of equal value, or possibly still greater, is the extremely friendly feeling we are gaining with the public and we are receiving much favorable comment on our "public spiritedness." I feel that this idea is well worth while and our experience has been that we are more than repaid for the little trouble to which we have been put.

Yours very truly,
ROBERT C. COFFY,
Manager, Everett Gas Company.

Publications

U. G. I. "Gas Works Book" Discusses Intermittent Vertical Retorts in Detail

Also Describes Company's Water-Gas Apparatus, Explains the Meaning of Its "Service" and Illustrates and Tells About Other Devices and Equipment

The complete discussion of intermittent vertical-retort carbonizing systems that is contained therein will alone insure the United Gas Improvement Company's "Gas Works Book," just published, a careful reading by most gas men, but, in addition, the work is valuable in that it places before the industry the company's whole story frankly stated.

The book contains 131 pages and is profusely and splendidly illustrated. It comes in cloth covers, measuring 9 x 12 in. A casual glancing over will reveal that it has been thoughtfully and carefully prepared. A more studied reading will reveal that this care was not confined entirely to technical accuracy, but to the style of presentation as well. It is easily readable throughout. In fact, in so clear a manner are the discussions carried on that it is quite possible that even one with very little knowledge of gas could read it through with considerable interest and very little conscious effort and receive considerable enlightenment therefrom.

Among the statements made in regard to intermittent verticals the following particularly caught the reviewer's attention:

"Immediately after the retort has been filled with fresh coal the carbonizing and coking process begins around the entire periphery of the retort walls, so that the gas produced is forced to pass through the less dense inner coal core without coming in contact with the hot retort walls. Experiments have shown that the carbonization proceeds gradually from the outside to the center of the retort, and that the core has a very low temperature until shortly before the whole bulk of coal is carbonized. . . . The exit of the gas through this low temperature core instead of along hot walls of the retort is of great benefit to the gas, since excessive decomposition and destruction by the hot walls are avoided. Furthermore, this also renders possible the carrying of higher retort temperatures, with consequent increase in retort capacity without accompanying injury to the gas.

"The coke produced in intermittent vertical retorts has become a very strong competitor on the basis of quality with the best metallurgical coke. . . . It is

discharged from the retorts in large bulk so that the breakage caused by impact against the conveying machinery is reduced to a minimum and a minimum amount of breeze is produced.

"From 150,000 to 350,000 cu. ft. of gas per man per shift is a very conservative estimate of the labor involved. . . . The work does not require especially trained men; it requires only a short time for an inexperienced man to thoroughly acquaint himself with his work.

"There are several benches now operating which have been in service for more than 2,000 working days without renewal of retorts or the necessity of anything beyond minor repairs. On an average, 1,600 working days seems to be the life of the retorts before the lower half has to be renewed. The life of the upper half is approximately 3,200 working days."

Proceedings of the New England Association of Gas Engineers—1915 and 1916

Cloth bound; 337 pages; illustrated; published by the New England Association of Gas Engineers. N. W. Gifford, secretary, East Boston, Mass.

Contains addresses and photographs of the presidents for the years covered, meeting reports, names of officers and names and addresses of membership; also the following papers:

British Thermal Unit Losses in Medium Pressure Line, by W. O. Brewer.

Coal Gas Candle Power, by W. J. Willien.

New Coal Gas Installation at Fall River, by C. W. Hunter.

A Concrete Pile Holder Foundation, by F. E. Drake.

Continuous Carbonization of Coal in Vertical Ovens, by Van Gemmingen.

High Pressure System and the Welding of High Pressure Mains at Springfield, Mass., by A. S. Hale.

Industrial Appliance Business, by W. H. Bradley.

Intensified Selling Applied to the Sale of Water Heaters, by A. A. Higgins.

Free Maintenance of All Gas Lamps by the Gas Companies, by J. P. Conroy.

Residence Burner, Maintenance in Lowell, by W. A. Parkhurst.

Gas Meters, by C. D. Jenkins.

Releveling and Aligning a 200,000-Cu.-Ft. Gas Holder, by A. R. Schiller.

Burning and Distilling Water Gas Tar, by Charles Otten, Jr.

National Safety Council Leaflets

Nos. 1, 2, and 3; the findings of a committee of fifty safety experts, working out the maximum and minimum requirements in safeguarding; paper backed; 16, 8, and 8 pages, 11 by 8 in., respectively; illustrated. Published by National Safety Council, Continental-Commercial Bank Building, Chicago, Ill.

The scope of these leaflets and those which will follow is to compile the best information obtainable about safety practices of all kinds and to present it in a logical and orderly form. Leaflet No. 1 deals with ladders, No. 2 with stairs and stairways and No. 3 with boiler rooms. The information contained in them is of an exceptionally practical nature and excellently presented. The efficiency of safety work is forcibly brought out by the council by presenting the results achieved by various companies. Among them are the Milwaukee Coke & Gas Company, with an 83 per cent. reduction in accidents, and the Rochester Railway & Light Company, with a 33 per cent. reduction.

Pipe and Public Welfare

Author, R. C. McWane; Cloth-bound; 166 pages, illustrated; 9 by 5 in., publisher, Sterling Press, New York City. Price $1.00 net.

Discusses pipe of various materials. Chapter 1 deals with historical matters and traces the evolution of pipe from the crude clay pipe of early Babylonian days to the 72-in. cast-iron pipes for gas laid in the Astoria tunnel; Chapter 2 deals with materials and methods of making metal pipe; Chapter 3 gives technical and historical data on metal pipe deterioration; and Chapter 4, which closes the volume, deals with wood pipe.

Early in the work the author asserts that none of the questions that must be considered in our growing municipalities are of more vital importance than the life of pipe used for water and gas mains. Thus, at the start, he gives the reader a strong hint as to the tenor of his discussion. It is quite palpable that in his opinion cast-iron pipe is the answer to the question.

Among the authorities he quotes in support of his contentions are W. R. Addicks, vice-president of the Consolidated Gas Company of New York City, whose assertion that: "The introduction of cast-iron pipe about 1808 for distribution purposes greatly aided in making the gas industry permanently successful. Cast-iron mains seldom require renewal except because of obsolescence due to existing mains being too small for the demands of modern industry," is quoted in full; George Beadenkopf, chief engineer of the Baltimore Consolidated Gas, Electric Light & Power Company; A. W. Craven, formerly chief engineer for the Public Service Commission,, First District, New York; J. H. Brown, manager, Eastern Gas Appliance Company, of New York City, and C. M. Saville, chief engineer of the Board of Water Commissioners of Hartford, Conn., and president of the New England Waterworks Association, who, in connection with the 42-in. Nepaug Pipe Line, built by that city, put a dollars and cents value on the superiority of cast-iron pipe for such a purpose.

Accidents That Could Have Been Prevented

A meter reader fell into a hole at the bottom of a cellar stairway. Another employee was injured by stepping into the space left exposed by the removal of a tread on a stairway. Still another employee, while walking in a cellar, fell into an ash pit.

All openings, temporary as well as permanent, should be guarded; but employees at all times should look where they are walking.

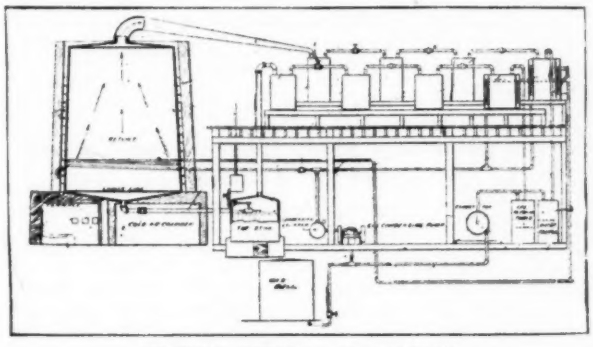
A short time after spilling benzol on his sleeve an employee struck a match and received burns on his arm when the benzol was ignited.

A moment's forethought would have prevented this accident.

An employee was injured by tripping over the handle of a poker which protruded in a boiler room passageway.

When not being used, fire tools should be hung up out of the way or stored in racks provided for the purpose. —*Safety News.*

Patents Pertinent to Gas Industry



SHOWING RETORT AND FIREBOX

A Double Set of Condensers are Provided in this Apparatus for Destructive Distillation

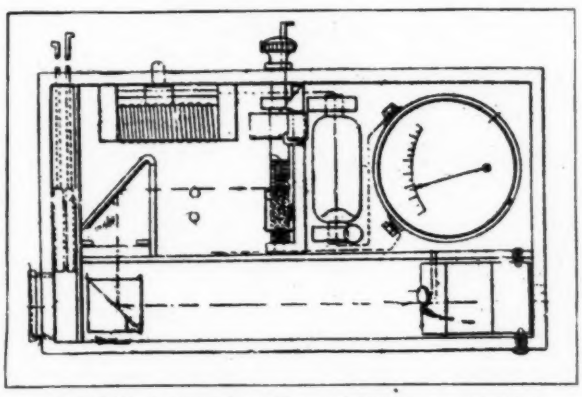
Patent No. 1,208,453; described in Patent Office *Gazette*, 12-12-16, page 627. James Whitney Barnes, Lake Charles, La. Filed Feb. 15, 1916. Serial No. 78,413. (Cl. 203-6.)

This apparatus consists of a retort and firebox. From the upper end of the retort a pipe conveys the vapor to a set of condensers, and from the bottom of the retort the residual liquid is drawn into a tar still. The still is heated and the liquid is vaporized, the vapors passing through a second set of condensers, an exhauster drawing the vapor through both sets of condensers and forcing it into a gas holder. Cooling coils are arranged in the retort and the condensers so that desired temperatures may be maintained.

Width of Opening Between Shutters is Method of Measuring Candlepower with this Photometer

Patent No. 1,208,279; described in Patent Office *Gazette*, 12-12-16, page 565. André Blondel, Paris, France. Filed Nov. 4, 1913. Serial No. 799,152. (Cl. 88-23.)

In this photometer the standard is a small incandescent lamp. Near the lamp are mounted movable shutters which may be opened or closed, a micrometer attachment measuring the width of the slit. The light from the standard travels through the slit, and falls upon a screen. A prism is arranged to receive the light from the screen and also has a transparent portion to transmit the rays directly from the light to be measured, parallel with the rays reflected from the reflecting portion of the prism.

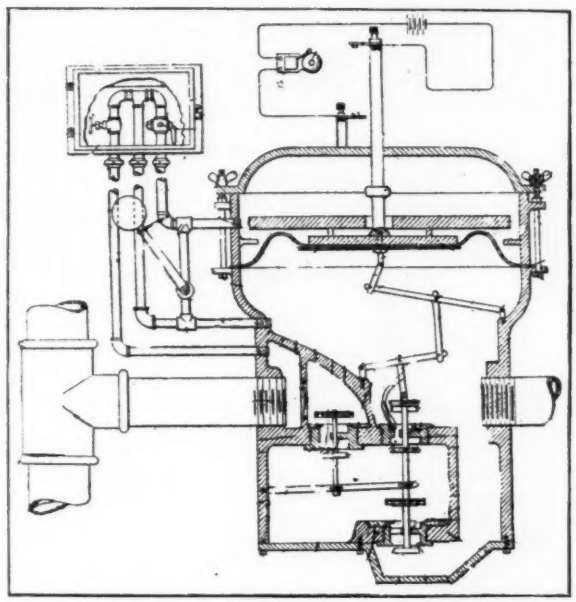


MOVABLE SHUTTER MAY BE OPENED OR CLOSED

Pressure Controlling Device Actuated by Weights and Pressure of Gas

Patent No. 1,208,392; described in Patent Office *Gazette*, 12-12-16, page 606. Walter C. Simmons, Kenton, O. Filed July 11, 1914. Serial No. 850,529. (Cl. 50-25.)

In this pressure regulator the casing is provided with the usual inlet and outlet openings, and is divided into two parts, the diaphragm making the division. Connected to the diaphragm are the links and levers which operate the valves, are superimposed upon the diaphragm are two weights. Lugs are provided on the casing so that the heavier of the two weights only travels upon the diaphragm for a short distance. Bleeder pipes are connected with the space above the diaphragm, the space below the diphragm, and immediately next to the inlet opening. The impulse of increased pressure is conveyed to the space above the diaphragm chamber through this latter bleeder pipe, while the drop in pressure is conveyed through the second bleeder pipe to the space above the diaphragm. The combination of the increased pressure above the diaphragm and the weights cause the diaphragm to move downward which tends to seat the valves. However, when the heavier weight is no longer superim-



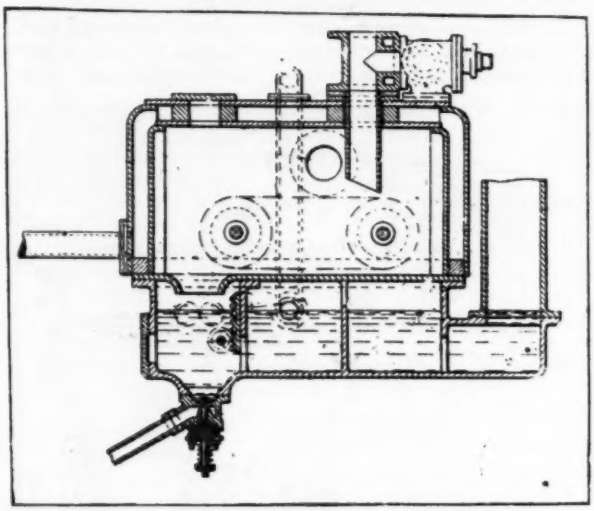
DIAPHRAGM DIVIDES CASING IN TWO PARTS

posed upon the diaphragm, but is supported by the lugs the motion is arrested, since an equal pressure is also built up underneath the diaphragm. When the drop in pressure takes place, the space above the diaphragm is bled through the bleeder pipe and the diaphragm tends to rise, thereby opening the ports until equilibrium is re-established.

Apparatus for Producing Pressure Gas Uses Water Chamber for Directing Flow of Gas

Patent No. 1,208,407; described in Patent Office *Gazette*, 12-12-16, page 612. Johan August Tillner, Boras, Sweden. Filed July 14, 1914. Serial No. 850,955. (Cl. 60-32.)

In this apparatus for the production of pressure gas a combustion chamber is provided with inlets for fuel and air, the fuel being fed automatically into the fuel inlet. A chain grate is installed in the combustion



WATER CHAMBER DIVIDED BY PARTITIONS

chamber under the fuel inlet. Communicating with the combustion chamber is a chamber containing water, and this water chamber is divided into several sections by metal partitions. These partitions have openings alternately above and below the surface of the water and means are provided for closing the openings below the surface of the water in order to direct the flow of gases from the combustion chamber through the water chamber. Automatic drain valves are provided and crusher rollers are placed under one end of the grate.

Ammonia Generator Comprises Three Sections

Patent No. 1,208,242; described in Patent Office *Gazette*, 12-12-16, page 551. Clarence W. Vogt, Louisville, Ky. Filed Oct. 15, 1915. Serial No. 56,137. (Cl. 257-238.)

This ammonia generator contains three sections; viz. a steam section closed at both ends, an ammonia chamber adjacent to one of the steam sections, and a liquor chamber adjacent to the ammonia chamber. Within the steam chamber are a number of tubes which communicate with the ammonia chamber, and which are closed at the far end. Extending across the ammonia chamber are a number of inner tubes which open into the liquor chamber at one end and which extend into the tubes in the steam chamber. Steam surrounds the tubes in the steam section, and strong liquor is fed into the liquor chamber. This liquor passes into the tubes extending into this steam section, the ammonia being recovered in the ammonia chamber. Weak liquor is drained from the bottom of this chamber, the ammonia itself being taken from the top.

Sleeve Prevents Stove Pipes from Coming Apart by Accident

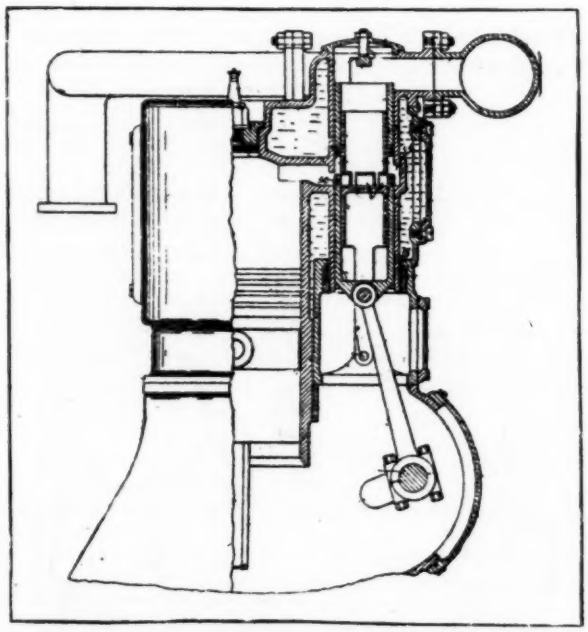
Patent No. 1,209,008; described in Patent Office *Gazette*, 12-19-16, page 860. Joseph Messina, Benld, Ill. Filed June 30, 1916. Serial No. 106,907. (Cl. 126-308.)

The stove pipe has a series of spaced depressions near one end. Sliding on the stove pipe is a sleeve which is provided with a finger to engage the depressions in the stove pipe. A second pipe section fits into the other end of the sleeve.

Internal Combustion Engine is Equipped with Tubular Valves

Patent No. 1,208,008; described in Patent Office *Gazette*, 12-12-16, page 576. Clifford S. Gory, Cleveland, O., assignor to The Engine Holdings Company, Cleveland, O., a corporation of Ohio. Filed June 24, 1910. Serial No. 568,612. (Cl. 123-59.)

Each cylinder of this engine has an additional cylinder cast on its side, with a port opening from one to the other. A sliding valve, with a port intermediate with its ends, adapted to register with the port leading into the cylinder, slides up and down in the secondary cylinder. A connecting rod operates the slide, being actuated by a crank mounted on an auxiliary shaft.



A SLIDING VALVE OPERATES IN EACH ADDITIONAL CYLINDER

News of the Gas Industry

Contract Between Boston Gas Companies Approved

The Massachusetts Gas & Electric Light Commission has approved a contract made Jan. 2, between the Boston Consolidated Gas Company, and the East Boston Gas Company, a subsidiary, which provides as follows:

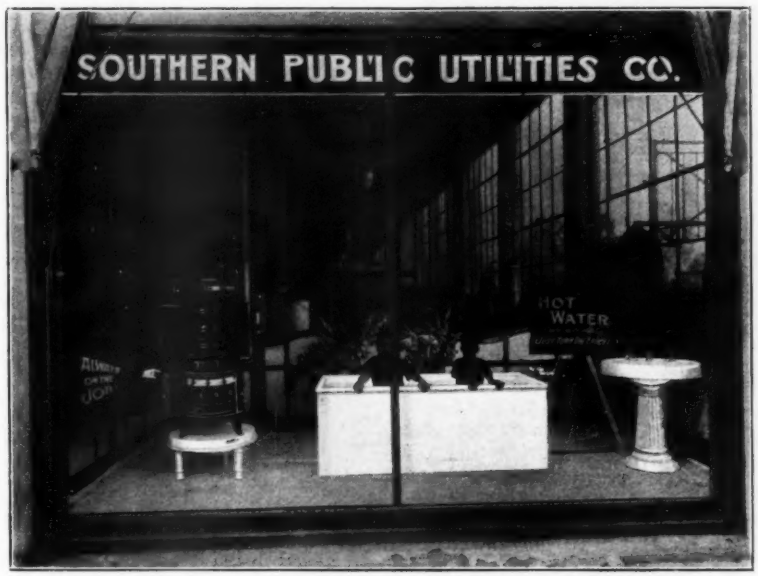
The Consolidated company agrees to sell and deliver for two years gas not to exceed 40 million cu. ft. per month, to the East Boston Gas Company, at its Chelsea holder; the latter company to pay 45 cents per 1,000 cu. ft., paying by the 15th of each month for all gas delivered the month before, the commission to have power to change the price on its own initiative if it finds it too high or too low; the East Boston company to pay $3,500 per year, equaling about 10 per cent., to cover cost of mains built by the Consolidated to deliver gas to Chelsea. The East Boston company agrees that its works shall be operated to the greatest extent consistent with economy.

Mayor Attempts Coal Holdup in Interests of Gas Company

The desperate situation of the Mt. Clemens Gas Company (Mich.) in the matter of insufficient coal supply to operate the plant, was demonstrated recently when an attempt was made, through the co-operation of the mayor, city attorney and Chief of Police to seize a car of coal, on a Grand Trunk siding, consigned to the D. U. R. at Marine City.

Mayor Bowers, City Attorney Lungerhausen and Chief Schelling made an official visit to R. R. Snyder, Grand Trunk agent, and a written demand was made upon the agent that the car of coal be delivered to the Mt. Clemens Gas Company, in the interest of "public necessity." Agent Snyder protested against the seizure, first having communicated the situation to the Chicago office of the Grand Trunk. The coal was not taken, but continued on its journey to the consignee. It is said that the local authorities were quite within their legal rights in making the demand, and that even a seizure by force would be upheld in view of the desperate conditions at the gas plant.

Fortunately the gas company is equipped with a duplicate plant which manufactures gas by the use of oil, steam and coke. The company has a quantity of coke, and this being so, the supply of gas will continue as usual. But there is another horn to the coal famine dilemma. By using the coke supply, the gas company must conserve its stock of coke fuel, and the coke users of the city may be cut off from their supply, even under contract, so far as applies to delivery from the gas company.



WINDOW DISPLAY DURING WATER HEATER CAMPAIGN

In connection with the attempted seizure of the car of coal at the Grand Trunk siding, it is related that when it became apparent that the coal was to be taken, a locomotive coupled on to the car and car and coal soon vanished.

Would Tax Oil and Gas Lands

A plan to levy a tax on lands under oil and gas lease on account of such status is being considered by the Legislature, with a view to overcoming the nontaxability of leases on such under the decisions of the Oklahoma State Supreme Court. The plan as outlined is a flat tax on leases, to be collected from the owner of the leases. The sum of 10 cents an acre has been fixed upon by protagonists of the plan. In view of the fact that there are about twenty million acres under lease in Oklahoma, the revenue to be paid to the state from such a tax would be approximately two million dollars.

Franchise Granted at Bastrop, La.

Several council meetings and two mass meetings have been held recently at Bastrop, La., before a final decision was reached on letting the gas franchise. The council gave the contract to Louis Lock of Monroe. The fuel gas will be supplied from the Progressive Oil & Gas Company's well No. 2, into the city of Bastrop. The laying of pipe will begin within the next six months and same will be completed by the end of one year from date.

Novel Window Display Attracts Much Attention in Southern City

The Southern Public Utilities Company recently had a real "live" window display which caused quite a sensation in Charlotte, N. C. In conjunction with the national advertising carried in the *Saturday Evening Post* by the Ruud Manufacturing Company of Pittsburgh, Pa., the Charlotte branch of the Southern Public Utilities arranged a special sales campaign and devoted a large window of the company's new offices on First and Church Streets to the display of Ruud Automatic Gas Water Heaters.

The display shown in the accompanying illustration was gotten up under the supervision of T. R. Stanford, gas solicitor. The little black bathers were secured with the understanding that as soon as one crew had been thoroughly washed and scoured with hot water from the Ruud, another pair might have a turn. One little fellow was so elated over the job he said it would take a week to make him clean.

The company does not measure the actual results of such a display as this by the number of sales closed at the time, but by the general publicity and pleasure it gives the passing public.

Commission Approves of Rochester Merger

Mergers of the Canandaigua Gas Light Company, the Dispatch Heat, Light & Power Company, the Eastern Monroe

Electric Light & Gas Company, and all but the electric railroad property of the Ontario Light & Traction Company into the Rochester Railway & Light Company has been approved and payment partly provided for through an issue of securities by the last-named company in an order of the public service commission.

Strong Pressure Well Now Under Control

The Southern Gas Company of San Antonio, Tex., brought in a gas well recently four miles west of Portland and eight miles north of Corpus Christi with an open flow estimated at better than 30,000,000 cu. ft. in a 24-hour period. While it is the fourth gas well for the district, it is the first that has been completed with the gas under control. Three of the wells got away from the crews and ran wild for weeks before they eventually choked up and died. Two of them were on fire for weeks, burning up millions of cubic feet of gas and lighting up the surrounding country for miles. The fourth well by the Witherspoon interests was never finished properly and the flow of gas was accompanied by a large volume of salt water. It is reported that this well has lately been brought partly under control.

The latest completion, the Southern Gas Company's well, is the first to have pure, dry sweet gas and be finished under control. It is said that plans are already under way to pipe the gas to Corpus Christi and San Antonio. M. W. Bahan, who is president of the Southern Gas Company, is the general manager of the natural gas department of the Texas Company, which might be construed to mean that the new gas find will become another source of wealth to one of Houston's big oil companies.

U. G. I. Sales Make Philadelphia's Rebate Largest Since 1898

Heavy increases in the sales of gas by the United Gas Improvement Company, during 1916, have resulted in a rebate to Philadelphia of $2,044,360.77. This is the largest sum ever turned over to the city in any year since the lease of the gas works to the United Gas Improvement Company in 1898. The city since that time has received rebates aggregating $19,139,361.91.

These figures became known when the statement of the U. G. I.'s business for the last three months of 1916 was filed with City Comptroller Walton by Lewis Lillie, vice-president of the company. The quarterly return, like the yearly, was the largest in the history of the city's relations with the gas company.

The company established another record with its sales of gas, upon which depend the city's revenue. The local sales reached 10,291,610,660 feet of gas, for the first time passing the ten-billion mark. This enabled the revenue of the company to "catch up" again to the basis of 1912, the year before the company's share of $1 for each 1,000 feet sold was reduced from 85 to 80 cents, in accordance with the terms of the lease.

Beginning in 1913 and continuing at the present time, the company has retained 80 cents and paid the city 20 cents from each dollar. In 1918 the company will receive 75 and the city 25 cents and continue on this basis until the lease dissolves in 1927. During the first years of the lease the company received 90 cents and the city 10 cents and from 1908 to 1912 the company received 85 cents and the city 15 cents.

Movements have at times been started to have the company reduce the price of gas to its consumers by the amount of the rebate. The company recently suggested that its business might expand if the price was lowered to consumers, but in the present condition of municipal finances it has been held inadvisable to lose this revenue.

Record Repair Work After Michigan Explosion

An explosion occurred at the plant of the Washtenaw Gas Company, Ann Arbor, Michigan, Saturday morning, Feb. 3, in the condenser room, which wrecked that part of the plant and disconnected all steam piping leading to the holder and condensing room apparatus. Although it was five above zero, the holder was kept from freezing, and by noon the wreckage was cleared away and steam piping was being connected up.

The city was kept in gas and repairs are being made as quickly as possible.

The cause of the explosion is unknown, but it is assumed it may have been the blowing of a seal, followed by ignition, in some unknown manner.

The Ann Arbor plant throughout thirty years has never found it necessary to cut the city off from gas for any reason.

Receiver Named for Two Washington Companies

The Everett (Wash.) Gas Company, which also operates the gas and electric utilities in Snohomish and Monroe, has passed into the hands of a receiver named by Federal Judge Cushman in Seattle. Elmer Dover, who has been in the past Pacific Coast manager for H. M. Byllesby & Company, was appointed to act in that capacity. It is a friendly proceeding.

Regarding the situation, Robert C. Coffy, local manager for the Everett Gas Company, states:

"The company has not been able during the past few years to earn the interest on the bonds outstanding and amounting to a total of $762,000. Under the terms of the mortgage securing these bonds it has been impossible to issue any additional bonds or to secure funds for any construction work, or for extensions, or the development of new business. It is anticipated that it will be necessary from this time on to develop new business and to make extensions to take care of the increases which are confidently expected in Everett in the future. In order to do this it is necessary to reorganize the company and to eliminate the restrictive provisions above referred to. It is contemplated that the company will be reorganized on a basis which will enable it to pay all fixed charges and to provide all necessary funds for future growth.

"All the local debts of the company have been paid and no one locally will suffer any loss. This same situation applies to the Tacoma Gas Company, which company is going through a similar reorganization.

"Insofar as our consumers are concerned, we trust that there will be no annoyance to them and that our service will be the best, the same as we have aimed to give in the past."

Notable Results Shown in Portland Company Returns

While the business of the company during the past year was conducted under the disadvantage of a constantly advancing price of everything entering into the manufacture of gas, the report to the stockholders of the Portland Gas Light Company at their annual meeting by the president, Col. Fred N. Dow, showed that closest study of the ways and means of economizing had effected savings in the aggregate worthy of note and with the increased business of the company affording a larger factor for the division of fixed and overhead charges, had helped to meet in part the unavoidable increase in cost.

As examples of the abnormal conditions due largely to the war, the president called attention to the fact that crude oil, of which nearly 400,000 gallons are used annually in the making of gas, commands 80 per cent. more than it did in 1915, while coal gas has advanced nearly 50 per cent. in price. The same abnormal conditions had also increased the cost of labor. The president stated, however, that ignoring the replacement cost of the oil and coal used, the company was exceptionally fortunate in having favorable contracts for both these commodities as compared with many other companies.

The report goes on to say: "That the business of the company during the past year was conducted under the disadvantage of constantly advancing prices of everything entering into the manufacture of gas, with no right upon our part to advance our selling charge to meet the increased cost of production. Abnormal conditions, due largely to the war, have materially increased our expenditures for labor. Those conditions are also reflected in the figures measuring expenditures under other heads. Crude oil, of which we use annually nearly 400,000 gallons, commands 80 per cent. more than in 1915. And gas coal, of which we use some 25,000 tons, has advanced nearly 50 per cent. in price. We were, however, exceptionally fortunate as compared with many other companies in having favor-

able contracts for both of these commodities, through which, in the case of oil, as to part of the year, and in that of the coal as to the entire year, we were protected from advance in price, if we are to ignore the replacement cost of the oil and coal used."

The president called attention to the fact that the high price of iron pipe had prevented extension of mains, beyond what seemed absolutely necessary, and of new mains only 8629 feet had been laid. The net increase, therefore, in mileage for the past year was 7264 feet as against an average increase for the past eleven years of 21,120 ft.

The extension of manufacturing facilities was foreshadowed by the president when he said:

"The increased demand for gas already apparent, with that immediately in sight, forcibly impresses the fact that it will be necessary to provide greater manufacturing facilities and more ample provision for distribution in the extension and in some instances enlargement of mains. This will call, within a comparatively short time, for large expenditures."

An increase in the number of consumers of gas for 1916 over 1915 of 6 per cent. was shown by the annual report of the treasurer, Burton Smart, submitted to the president and stockholders. His report showed likewise an increase in gas sold and accounted for of 27,832,800 cu. ft., and a decrease in leakage and unaccounted for gas. This item in 1915 amounted to nearly 7 per cent. and during the past year to only .058 per cent.

His report showed that the net earning had increased from $72,306 in 1915 to $85,909 for 1916.

New Equipment Company Established

A new company, specializing in high-grade apparatus, has recently been formed by L. S. Shaw, which will operate under the name of L. S. Shaw & Company, with offices in the Dime Bank Building, Detroit, Mich.

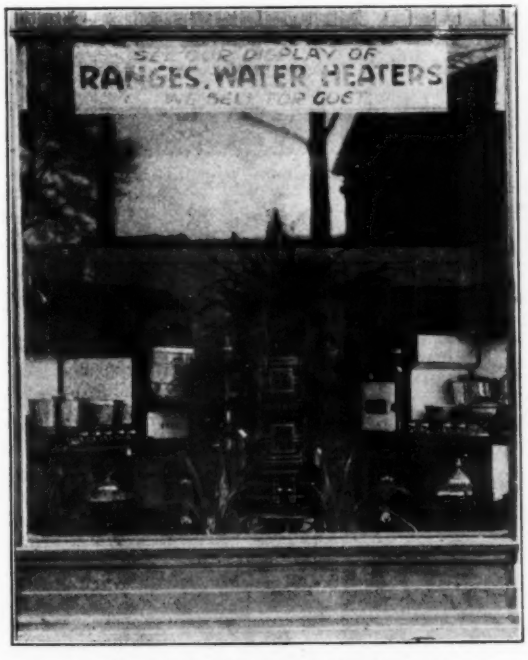
Mr. Shaw has had fifteen years' experience in power plant design, construction and equipment, having been connected with the Consolidated Gas Company of New York, J. G. White & Company and the Edison Company of New York. Mr. Shaw has been manager of the power department of the Westinghouse Companies at Indianapolis, Chicago and Detroit.

Opening of New Gas Plant at Wilson, N. C.

On Jan. 4, 1917, gas was turned in the gas mains of Wilson, N. C. This plant is under the supervision of F. C. Armbruster, formerly assistant superintendent of the Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va. Beginning Jan. 10, cooking demonstrations were held each day by Miss Ethel A. Church. The office was crowded to its capacity each day by the housewives of the city to witness these demonstrations, and great interest was manifested. Crowds visited the gas office until late in the evening to see the complete line of "Pittsburg" water heaters, ranges, etc., that were on display.

To date, Mr. Armbruster reports that forty automatic water heaters, sixty tank heaters and over two hundred ranges have been sold. A complete line of "Pittsburg" heaters is connected up in actual working condition in their attractive display rooms and has created quite a little interest.

Edgar Morris, representative of the Pittsburg Water Heater Company, was on hand and assisted in demonstrating the many features of the water heaters. An intensive direct-by-mail advertising campaign, specializing on the new "Pittsburg-Bungalow" heater, was a feature of the opening to the city of the use of gas. The prompt response of the people of Wilson makes it apparent that the gas department of that thriving city will more than equal the records set by other gas companies of its size, in getting "new business." A picture showing the window display used is shown herewith.



HEATER DISPLAY AT WILSON OPENING

William H. Morgans Dead

William H. Morgans, who organized and for several years managed the Pontiac (Mich.) Gas & Electric Company, died Jan. 29, 1917, in Chicago, where he was visiting, according to a telegram received by relatives. He was 72 years old.

Forty years ago Mr. Morgans left the Detroit Gas Company to accept the managership of the L. R. Medbury Gas Company of Pontiac. Later the company was reorganized and the name changed to that of the Pontiac Gas & Electric Company. He retired from active business fifteen years ago.

Mr. Morgans was a Civil War veteran. He was a member of the Knights of Pythias and Moslem Temple, F. & A. M., of Detroit.

Personal Notes

CHARLES W. BENNETT was elected general manager of the Detroit City Gas Company at the annual meeting of the board of directors following the annual stockholders' meeting in the company's offices, Tuesday, Jan. 23. Mr. Bennett came to Detroit from Binghamton, New York, last April to take the position of assistant general manager. The advancement of Mr. Bennett to general manager will relieve Victor F. Dewey of much of the detail work in connection with the operation of the company which has devolved on him in filling the position of vice-president and general manager during the last three years. This will enable Mr. Dewey to devote a greater part of his time and attention to the executive, financial and constructive policies of the company. Prior to coming to Detroit Mr. Bennett for some time filled the position of general manager of the Binghamton (N. Y.) Gas Works, which is also a subsidiary of the American Light & Traction Company.

THE MILAN GAS COMPANY of Milan, Ind., held its annual stockholders' meeting recently and the following officers were elected: President, Thomas Thompson; vice-president, George Laws; secretary, Charles Laws; treasurer, Robert Borders; directors, T. H. Thompson, J. W. Mulford, Bine Whitlatch, George Koenig, Arthur Van Luenen.

THE STAMFORD GAS & ELECTRIC COMPANY elected the following officers at its annual meeting, held recently: President, Walton Ferguson; vice-president and general manager, Alfred W. Dater; secretary and assistant treasurer, Charles H. Lounsbury; treasurer and assistant secretary, Wilson L. Baldwin. The following directors were elected: Walter Ferguson, Charles H. Lounsbury, Edward E. Rowell, Albert J. Hatch, Samuel Pierson, Alfred W. Dater, Schuyler Merritt, Irving E. Raymond, Walter E. Houghton, Walter D. Daskam, Wilson L. Baldwin, Frederick C. Taylor and John H. Goss.

Societies and Associations

THE DAYTON SECTION OF GAS METERS held a meeting at the offices of the Dayton Gas Company Monday night, Jan. 29. About one hundred members were present and heard an interesting and instructive address by F. R. Hutchinson, of Cleveland, grand commissioner of the National Gas Meters. Mr. Hutchinson was formerly special agent for the East Ohio Gas Company, but is now sales manager for the Gas Appliance Company of Cleveland. He talked on "Home Heating with Gas," declaring the advantages of gas over coal from an economical standpoint were numerous, and had been proved by test.

THE PORTLAND GAS LIGHT COMPANY gave its annual banquet to its employees at Riverton Casino, Portland, Maine, Jan. 24. Members of the city government, representatives of the Welsbach Street Lighting Company, Philadelphia, The Welsbach Company, Gloucester, N. J., and many local firms were among those present. Three special cars took the party to and from the city, leaving the square at 6.30 p.m. After a most appetizing dinner the toastmaster, Burton Smart, who is treasurer of the company, gave a brief description of the working of the plant and called upon the members of the different departments to rise as he named them. Different members of the assembly then made short talks. After the speechmaking, everybody went upstairs, where an exceptional program was enjoyed.

THE AMERICAN GAS INSTITUTE held its third meeting of the directors at the Institute offices, New York City, Jan. 11, 1917. The meeting was called to order by the president at 10.30 a.m., with the following directors present: A. E. Forstall, president; A. M. Barnes, Chas. M. Cohn, Geo. B. Cortelyou, L. R. Dutton, O. B. Evans, Wm. McClellan, Wm. E. McKay, H. K. Morrison, J. Arnold Norcross, Geo. G. Ramsdell, secretary, H. W. Hartman, assistant secretary. Present by invitation: Geo. T. Macbeth, chairman of technical committee. The following action was taken on matters brought before the board: The president was authorized to appoint an important delegation to attend and represent the Institute at the meeting of the Bureau of Mines, to be held in Pittsburgh during the week of Oct. 15, 1917. It was decided that the Institute accept the invitation of the National Chamber of Commerce to become a member of that body, and that delegates be appointed to deal with all matters in connection with such membership. The report of the public relations committee was presented by the secretary. G. T. Macbeth, chairman, submitted the report of the technical committee. The preliminary report of the committee on electrolysis was accepted, with the recommendation that this committee continue its labors and be requested to publish this report as early as possible for the use of the members of the Institute. The following by-law was adopted: "18-*b* (Section 36): Immediately after each annual meeting of the Institute the secretary shall compile a list of all matters referred by the Institute at that meeting to the board of directors for consideration, and shall present this list to the board at its next meeting." It was decided that the next meeting of the board of directors would be held in Boston, Thursday, Feb. 15, at 2.30 p.m., in conjunction with the convention of the New England Association of Gas Engineers.

Construction Notes

Soon to Build Pipe Line in Oklahoma

The contract is to be let in the near future for the construction of a pipe line from the Blackfield oil and gas field to the town of Newkirk, Okla., the object being to supply the county seat with an abundance of gas.

A number of months ago the citizens of Newkirk voted bonds in the sum of $250,000 for the construction of the pipe line, and to try and induce some industries to locate there. Up to this time, however, the county seat residents have failed to secure any great industries, and have decided to build the pipe line, and thereby secure an ample gas supply. The construction of the line is the first work done with the money voted at the election.

Welded Main to Be Laid in Southern California

The Southern California Gas Company has started replacing the gas main between San Bernardino and the steam plant at Colton, Cal., via Colton Avenue, with a new welded pipe line. A similar main will be laid between Riverside and Colton. The improvements will cost about $15,000, according to Manager C. M. Grow. A large force of men is working on the improvement between Urbita Springs and the corner of South E and Mill Streets.

Orangeburg, S.C., to Have Gas Plant

An engineer has recently been in Orangeburg, S. C., and made the necessary surveys and estimates for a proposed gas plant. The officials of the Orangeburg Chamber of Commerce have been assured that the plant will be erected in that city. The promoters of the gas plant have made three propositions to the citizens of Orangeburg, all through the Chamber of Commerce, one of which will certainly be accepted, and which will mean the early erection of this needed industry in Orangeburg.

Contract Awarded at Philadelphia

Frank G. Stewart, of Philadelphia, Pa., has been awarded the contract for alterations and additions to the building at Eighth and Mifflin Streets for United Gas Improvement Company. Private plans.

Plans Concluded for Plant at Victoria, Tex.

H. C. Kellum, who was granted a fifty-year gas franchise at an election held in Victoria, on Oct. 12, 1916, has addressed a letter to the mayor and city councilmen stating that he has concluded his arrangements for financing and building the plant and asks that the latest blue prints of the city showing the streets and additions be forwarded him.

New Main Promised Denton, Tex.

The local gas company has promised that before another winter opens Denton's service will be improved with the laying of a second four-inch main from the supply station four miles north of the city.

Northern Illinois Public Service Company Asks Bond Issue

The Public Service Company of Northern Illinois, which took over the Northwestern Gas Light & Coke Company several years ago, has applied to the state public utilities commission for permission to issue $5,000,000 in 6 per cent. debenture bonds, to be dated March 1, 1917, and to mature annually in equal amounts for five years.

Vice-President John H. Gulick, of the Public Service Company, said the principal reason for arranging a bond issue now is to cancel the outstanding notes of the Northwestern Gas Light & Coke Company, amounting to $3,500,000.

Detroit Company Moves to New Building

The Detroit City Gas Company moved into its new four-story building at the corner of Clifford Street and Bagley Avenue over the week-end and opened for business Jan. 29, 1917. The new building was designed for the exclusive use of the company. The old building at Washington Boulevard and Clifford Street will be remodeled for offices.

STONEHAM, MASS—The Malden & Melrose Gas Light Company has been granted permission to open Washington Street at Garfield Avenue for the laying of a main.